

Modern Refrigeration & Air Control

Vol. 62 No. 741

DECEMBER, 1959

Price 2s. 6d. monthly



Erinoid

polystyrene for refrigerator components

Erinoid grades of polystyrene are ideally suited to low temperature applications. For example, Erinoid CP.20 grade is a high impact polystyrene which has excellent flexural strength and exhibits high elongation coupled with good tensile strength. It is easily processed by injection moulding, giving a fast rate of production with a high-gloss surface finish. Then there is KLP general purpose grade—easy flowing and ideal for transparent mouldings.

This is the new Electrolux model L 26 refrigerator. The ice compartment and the drip tray are in Erinoid CP.20, the door shelves are in Erinoid KLP transparent blue.

Erinoid

polystyrene is manufactured by

STYRENE PRODUCTS LIMITED

Full information, samples, prices etc. on application to

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cool
2000
tons...



This ammonia storage sphere belonging to Fisons Limited is believed to be the largest of its kind in the world. Under its 3-inch layer of low vapour transmission Onazote it keeps 2,000 tons of ammonia at 32°F. The thermal insulation was undertaken by Onazote Insulation Company. They have unequalled experience in keeping temperatures low—down to -258°F. in the case of liquid methane. The refrigeration plant for this project was supplied by L. Sterne & Co.

ONAZOTE
WATER VAPOUR TRANSMISSION
at 100°: 38°c and 100% relative humidity
1 gm/sqm/24 hr/2"

Onazote Insulation Company Ltd

A subsidiary of Expanded Rubber Company Ltd.

675 Mitcham Road • Croydon • Surrey • Thornton Heath 3622

TA/2837

MODERN REFRIGERATION December 1959

SMITHS

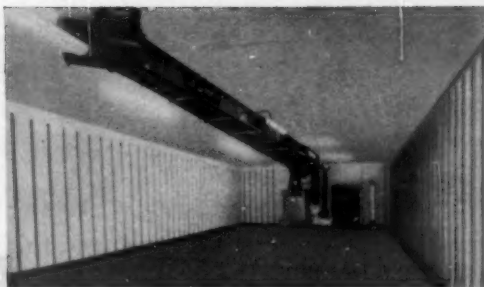
**build 4 new
extensions for
Lightfoot Cold
Stores Ltd.—**

with 2 more to follow

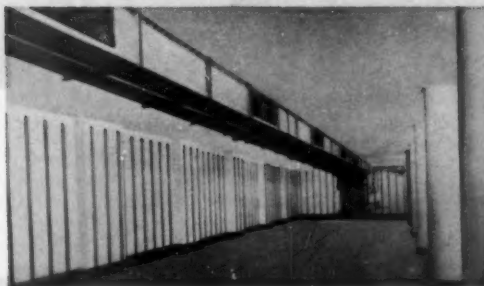
All these stores have air cooling by ducts, dunnage wall battens, polar white walls and ceilings, and granolithic floors.

Photographs by courtesy of Lightfoot Cold Stores Ltd.

**SMITHS
should build your
new cold store**



This store at Bedford has a cubic capacity of over 17000 c. ft.



A dry air lock is incorporated at one end of this store at Hove



At Aldershot a roof was built over existing brickwork with a suspended ceiling.



The Southampton store is built in a basement under two existing stores.

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Est. 1874. Burton-on-Trent Tel. 2061/2

London Office: 105 Empire House, St. Martins-le-Grand, E.C.1. Tel: MONarch 2000



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MODELS FOR
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DAIRY PRODUCE
FROZEN FOOD
ICE CREAM—

*in a range of styles and
colour schemes*

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THEM AT THE
SMITHFIELD SHOW
COME AND SEE
THEM AT HORNSEY**

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Refrigerated Self Service Display!

They SELL MORE—SAVE MORE
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REFRIGERATION TECHNIQUE

The Smithfrige-McCray "Koldflo" system keeps food temptingly fresh, cuts operating costs.

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VISUAL APPEAL

Extra capacity ensures maximum stock on display.
Full Product Visibility. Easy Shopping Angle

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Through precise temperature control with automatic defrosting

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STYLING AND COLOUR SCHEMES

With warmed reach in rail and ample storage room

The Self Service Cases which anticipate the needs of tomorrow, opening up new fields for **EXTRA SALES, EXTRA PROFITS, EXTRA PRODUCT VARIETY**

They are easy to shop—easy to stock

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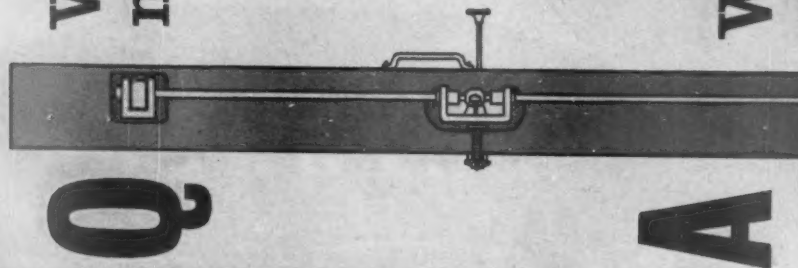
Smithfrige-McCray
KOLD FLO
SELF SERVICE CASES

Q

**When is a door
not a door**

The "MINIVEIL" air curtain permits the cold store door to remain open for prolonged periods, giving completely free passage for men and goods, with a negligible rise in store temperature. This is achieved by a controlled curtain of air over the outside of the door-opening the whole time the insulated door is open.

No longer need you bother about the constant opening and closing of cold-room doors or the proper operating of air locks by the coldroom staff. You can rely on the protection afforded by the curtain of air provided by a "MINIVEIL" unit.



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AIR CURTAIN**

When it's a

**Let us help you
TO PUT SOME
LIGHT ON THE
PROBLEMS OF**

WET INSULATION

The Minikay System keeps new insulation permanently dry and dries out existing wet insulation.

The Minikay System eliminates the heavy cost of re-insulation.

The Minikay System extends the life of your cold store to that of normal buildings.

Cold Storage insulation is extremely valuable—protect it with Minikay.

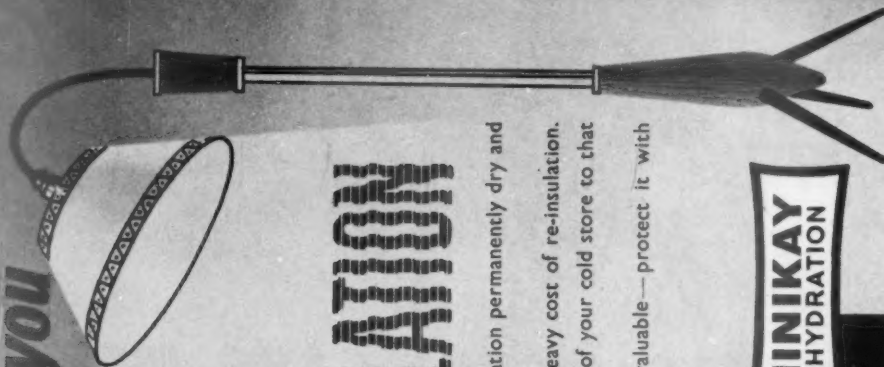


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**For Efficient COLD STORAGE Operation
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*Automatic Electric Defrost Coolers
have that others have not ?*

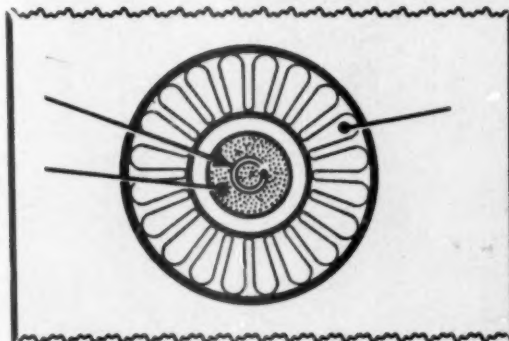
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HEAT APPLIED IN
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Carbon Dioxide Department,
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Manchester.

24th. September 1959.

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Yours sincerely,

L. Chandler

P.P. L. Chandler (Smithfield) Ltd.

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They incorporate, as an integral part of the fitting, the correct amount of solder for making quick, sound and trouble-free joints which are proof against seepage by refrigeration gases and other fluids under pressure.

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*Pipework arrangement—
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Fittings—in compressor
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of Messrs. Kraft Foods Ltd.
(installation by Messrs. L.
Sterne & Co. Ltd.)*



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9 models: $\frac{1}{4}$ h.p. to $\frac{1}{2}$ h.p.



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and air-conditioning
these unique compressors

by *Tecumseh*



Tecumseh Motor Compressors are craftsman-built to the designs and patents of Tecumseh Products Co., Michigan, U.S.A., from all-British components and materials. The 80 years' unrivalled experience of L. Sterne & Co. Ltd. goes into the manufacture of these refrigeration compressors. Exacting specifications ensure longer life and greater durability.

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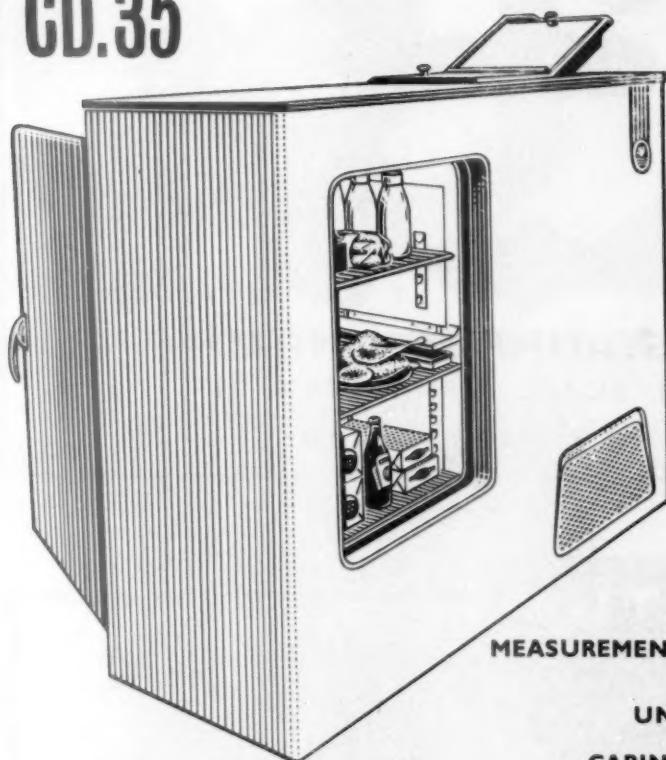
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- ★ One DANIELS frame-interchange machine does the work of two conventional machines.
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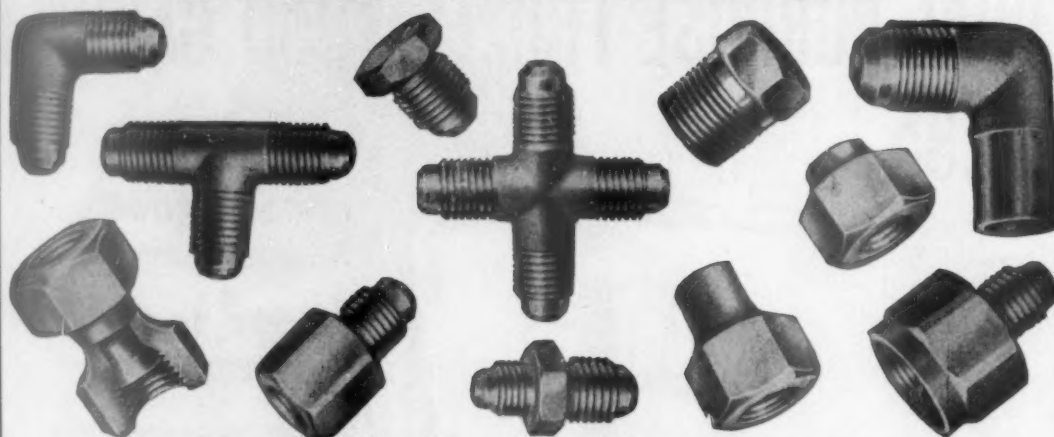
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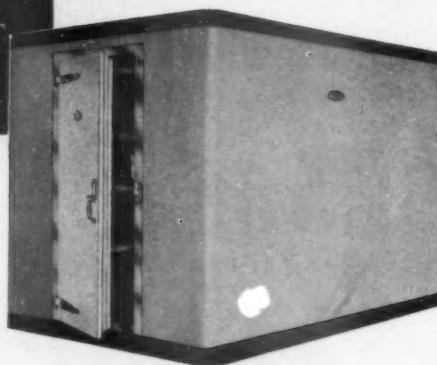
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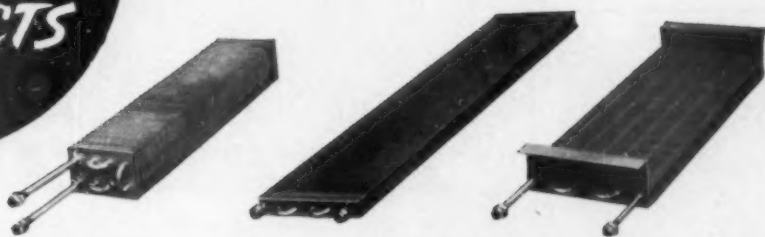
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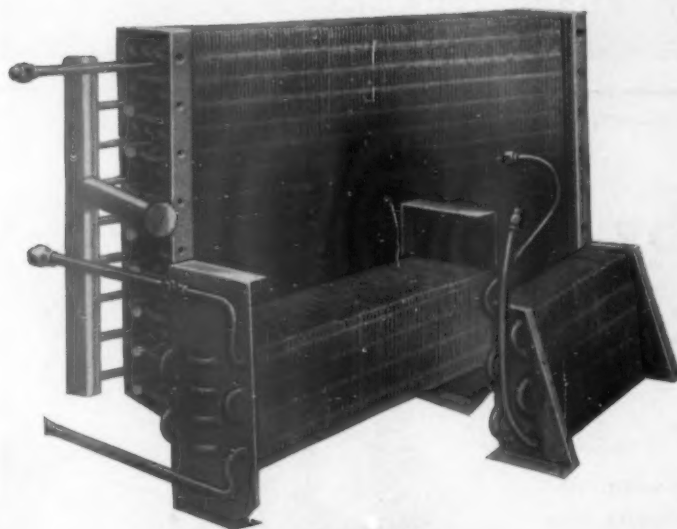


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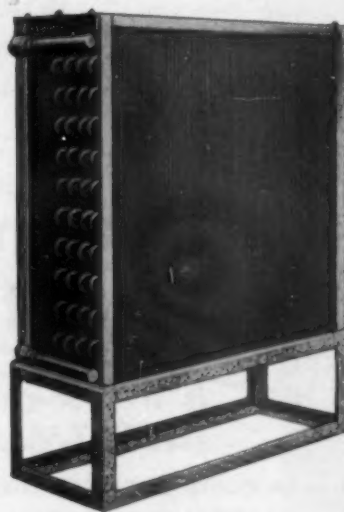


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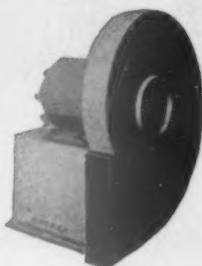
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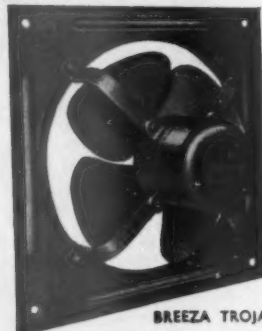


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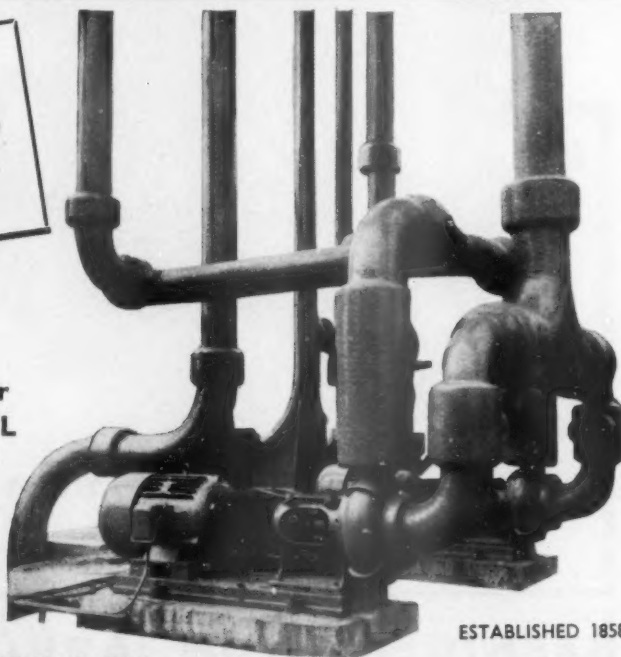
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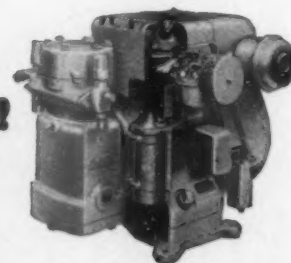
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Packaged
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The only refrigerator - compressors
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Here is the answer to mobile refrigeration and air conditioning when electricity is not a practical source of power. The ONAN Packaged Engine-Compressor is controlled directly from the driver's cab so that the driver can watch a temperature dial and switch on the compressor as necessary. This is a big advance over standard van equipment where the compressor runs without stopping throughout the entire journey.

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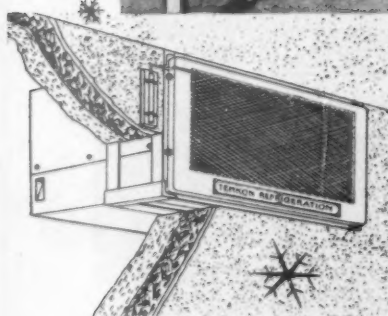
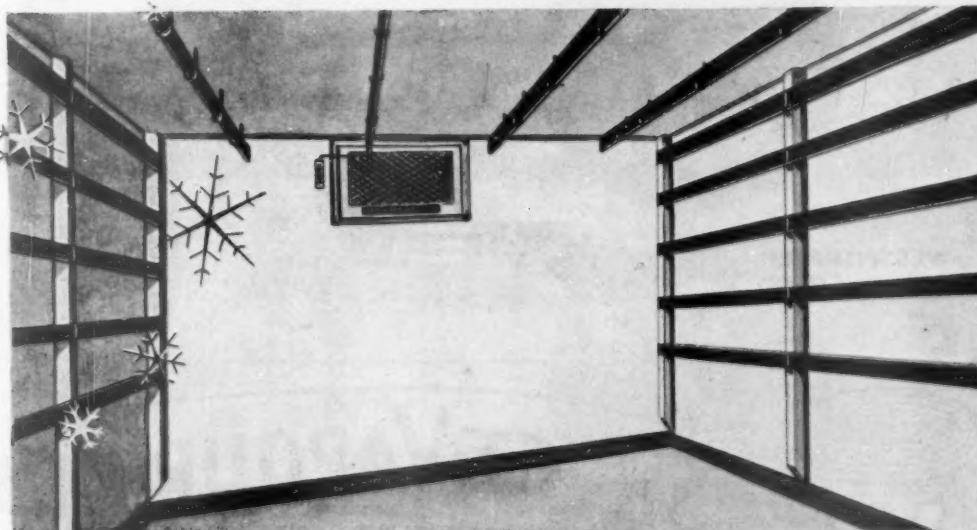


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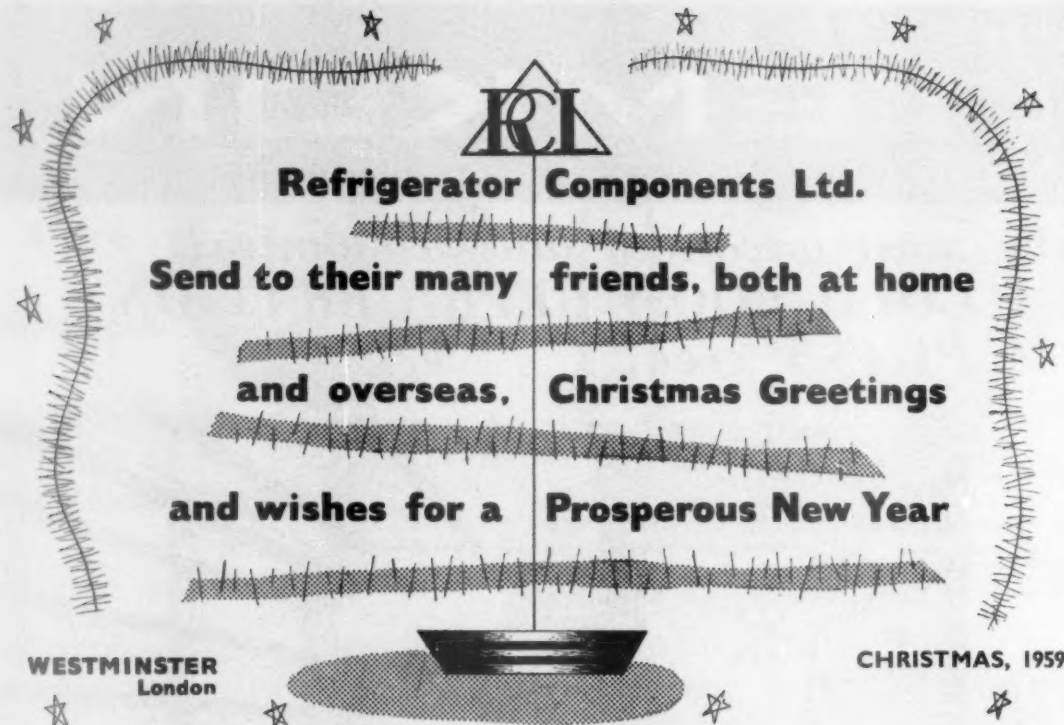
Only Temperature Ltd. could bring you so many outstanding design features, such amazing economy! This new TEMKON plant is completely self-contained, really compact and easy to install. Suitable for ambient temperatures up to 120°F, it maintains an accurate cold room temperature range from -10°F. to 60°F.—with fully automatic defrosting. TEMKON "package" design avoids complicated site wiring and refrigerant piping, gives you more cold room space—produce can be stacked to within 8" of the ceiling. No doubt about it, these new TEMKON units set the pace in efficiency for a wide range of static and mobile cold room applications.

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1½–2 h.p. self-contained, auto-defrost refrigeration plant
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Largest producer of packaged air cooling plants outside the U.S.A.

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RCL

Refrigerator Components Ltd.

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and wishes for a Prosperous New Year**

WESTMINSTER
London

CHRISTMAS, 1959



V.S.
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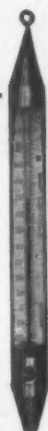
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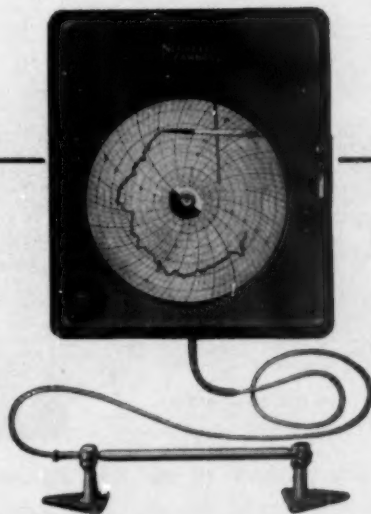
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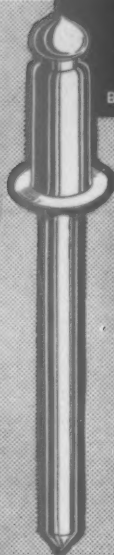
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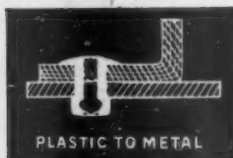
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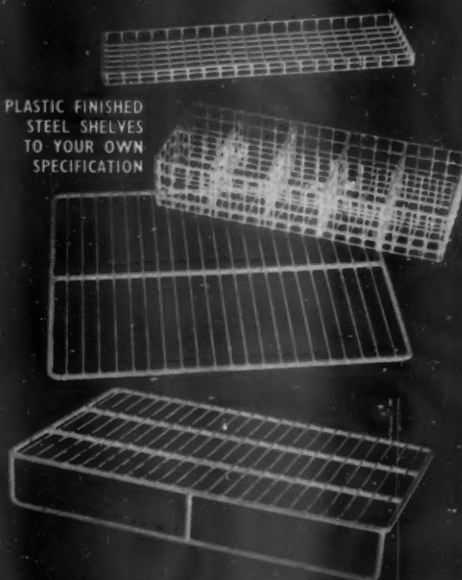
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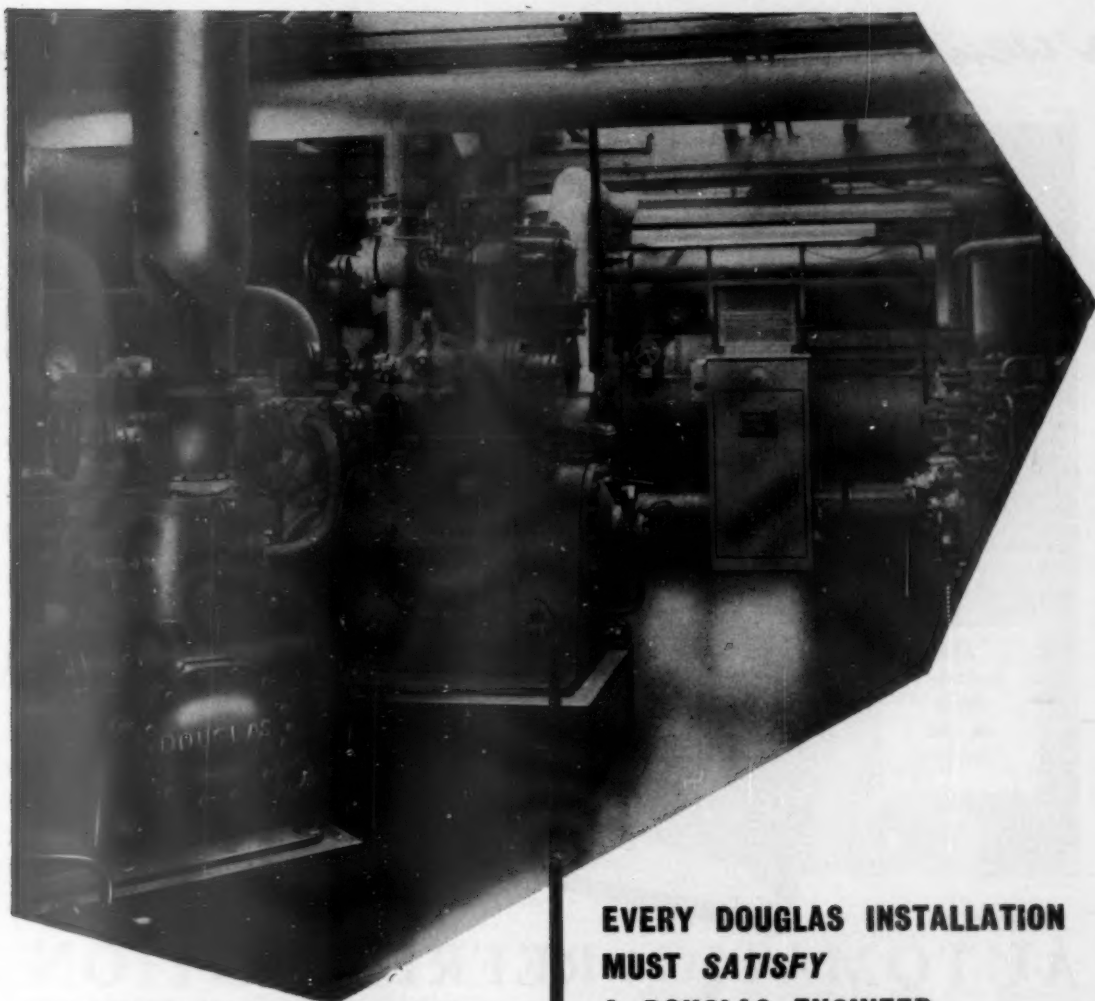
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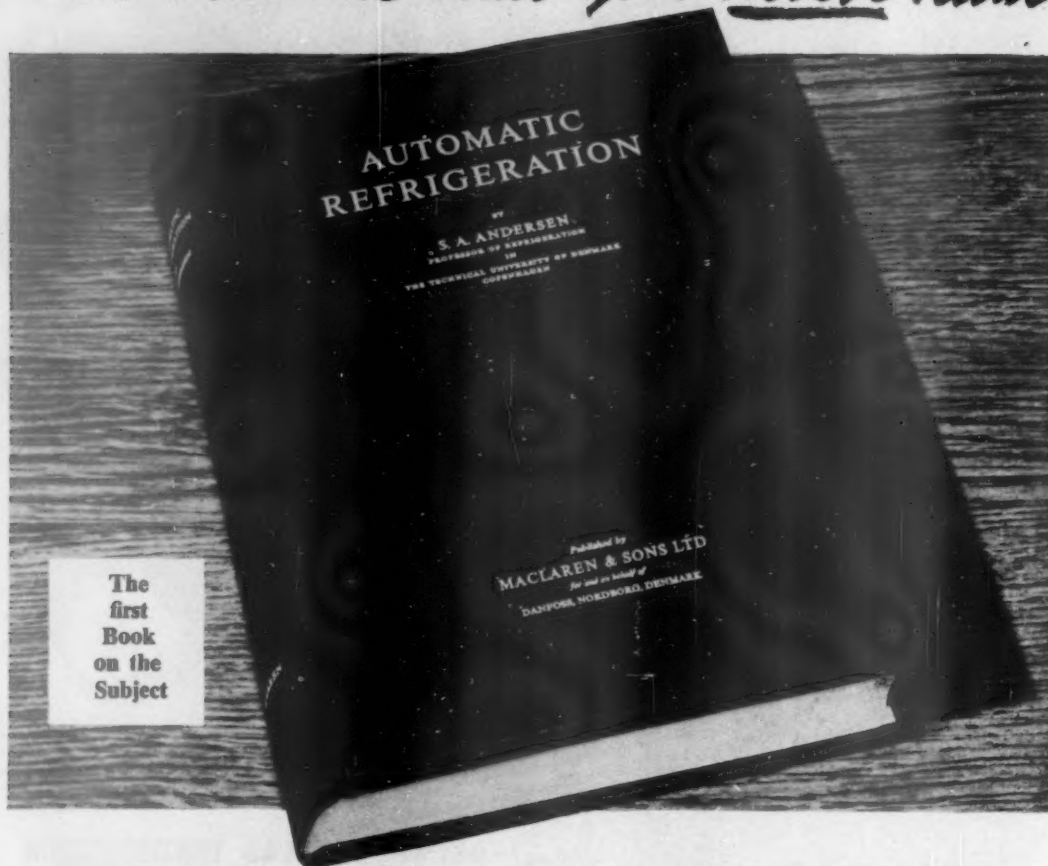
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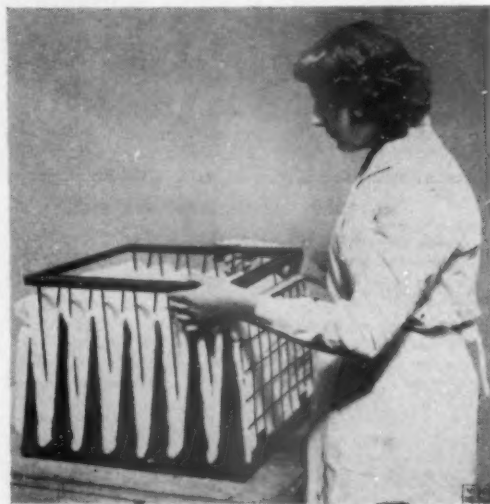


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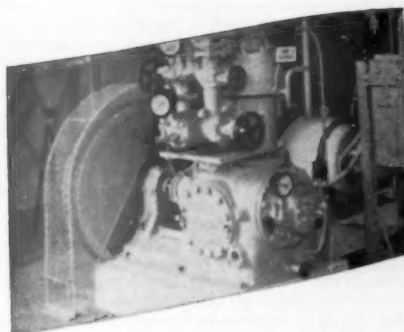
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NUMBER 741

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Photo by Fritz Ott.

● There was a nice blend of history and modernism at the Park Lane Hotel, London, last month, when Kelvinator Ltd. not only celebrated the 45th anniversary of their first successful domestic fridge—the first in the world—but also launched a spanking new line of 1960 models; the latter fact was itself, we believe, a post-war record, for not since 1947 has a British maker refurbished its whole range at one fell swoop.

● The birth of the domestic refrigerator is yet another example of a British invention which was left, for some years, to the commercial drive of the United States to develop, state Kelvinator's historians. "As the Russians appear to have put in no prior claim, credit for the modern kitchen fridge and the mighty world-wide industries that have been developed on the refrigeration principle, belongs to a Scots scientist, William Thomson, later to become Lord Kelvin. But it took an isolated incident in the American Civil War before Lord Kelvin's findings were incorporated mechanically and seriously applied to the service of mankind. In the mid 1860s a small steamer broke the northern blockade of New Orleans to deliver a commercial ice-making machine to a city which for three years had been deprived of natural ice. However, it was not until 1890, after an unprecedented warm winter, that the United States began experimenting with the construction of commercial ice plants to overcome a serious shortage of ice. It was not until 1914, however, that anyone tried to adapt the principles of commercial ice making to a smaller machine for refrigerating foods in the home. In the summer of that year, Edmund J. Copeland brought Nathaniel B. Wales, an engineer obsessed with the tremendous potentials in mechanized home refrigeration, to see Arnold H. Goss, a prominent Detroit industrialist. And Goss was interested enough in the idea to finance initial experiments."

● Wales built his first refrigerating mechanism for home installation during the autumn and winter of 1914 in Detroit. After producing a series of experimental models, Goss and Copeland incorporated under the name of Electro-Automatic Refrigerating Company, Inc., in May 1916, with Wales as chief engineer. Two months later, in tribute to the British scientist who had pioneered the principles of refrigeration, the firm's name was changed to Kelvinator.

● The Chancellor of the Exchequer's plea for lower prices in industry is being answered by Kelvinator's. Although price comparisons with competitive models, and with a manufac-

turer's previous models, are often invidious due to the difficulty of striking a true basis of comparison, Kelvinator state that their price per c.ft. of refrigeration space has been reduced by approximately 7 per cent. on their new 6-c.ft. model and has been substantially reduced in their 7-7- and 9-4-c.ft. models. Taking into account the increased luxury in these refrigerators, this reduction is equivalent to at least 10 per cent. over their last year's prices.

● We feel that refrigerator salesmen do not stress sufficiently the fantastically low prices of present-day fridges as compared with, say, motor-cars. The 1939 £100 Popular car costs to-day approximately £400. without tax, while the pre-war £50 fridge now markets for approximately £60, less p.t.—a truly remarkable achievement, we feel.

● Our recent article on the subject of frozen milk has created great interest and inquiries for further details have been received from as far away as Malta. Normal good quality pasteurized milk can be kept in ordinary milk bottles or other containers for periods of about two weeks at just above 32° F. (0° C.) without any serious loss in its "consumer" quality. Attempts have been made with varying success to keep pasteurized milk for longer periods by storing at temperatures well below freezing point. On thawing, the usual result is a product which has developed unpleasing physical properties. Separation of the fat in a greasy condition is one of these defects, particularly if the milk is used in tea or other hot beverages. Owing to physical changes in the protein of the milk, a slightly clotted effect is also observed. The process referred to in our October issue, which has been devised at the National Institute for Research in Dairying at Shinfield, provides frozen milk of very long keeping quality, and which displays none of the defects mentioned above. Provided the frozen product is kept at, or a few degrees below, 10° F. (-12° C.), a safe storage life of at least 12 months is assured, and on thawing out, the physical properties and "consumer quality" of the milk are indistinguishable from those of first-class pasteurized milk. The stored milk has a colony count lower than that of the pasteurized milk from which it was originally produced and shows no evidence of physical changes in the proteins. Its keeping qualities after thawing out are at least as good as those of the original pasteurized milk. Moreover, on standing for a short time, it gives the "cream line" which is found with fresh milk, in contrast to mechanically homogenized milk which does not give a cream line. The process cycle of the Shinfield process is: Standard pasteurization either by

batch or by the H.T.S.T. method; immediate treatment of the pasteurized milk with ultrasonic vibrations of 1 to 1.3 Mc/s for a period of at least five minutes at a power of 22 to 55 watts per litre of milk; careful filling into clean containers which are closed by a standard heat-sealing process; freezing in a temperature of -15°C . at a controlled rate, so that freezing is completed in fewer than 60 minutes; removal to cold store at -12°C . The five steps are arranged so that the whole process is a semi-continuous one, with minimum delay between the steps. The invention is the subject of British and foreign patents and patent applications; the rights in these have been assigned to the National Research Development Corporation which is the licensing authority for the process. Eldorado Ice Cream Co. Ltd. is the company which is licensed by the N.R.D.C. to operate the process. The ultrasonic equipment was developed by Mullard Limited.

● Readers may recall the pre-war advertisement of a removal firm who always portrayed their staff as "gentle giants" treating customers' property with the greatest respect. Such an image is projected by two recent reports of the Minister of Health and the Minister of Agriculture, Fisheries and Food. These codes of practice on the hygienic handling of meat in course of transport and in the retail trade have two broad aims: the meat should be handled and transported under the best possible conditions, and those handling it should not through familiarity treat it with less care than they would expect to have been given to meat which they eat themselves. The Minister of Health, in a foreword, says that the codes are being published as a helpful and practical contribution to the better handling of meat; he also pays tribute to the work done by a committee of the Royal Society for the Promotion of Health, who offered the Ministers the opportunity of using their drafts as a basis for officially published codes. The care of meat, particularly in relation to the use of refrigeration, was also the subject of the December meeting of The Institute of Refrigeration in London. Mr. F. R. Gerrard, for many years the leading "professor" in Britain on practical meat matters, dealt with the topic as seen through the eyes of the butcher, while Mr. J. A. Stonebanks, chief sales engineer at Hendon, discussed the plant side of the subject. We liked Mr. Gerrard's summing up that "the distribution of meat is a race between micro-organisms and the human organism, the micro-organism winning in the end (unless we decide on cremation). The butcher uses delaying tactics in the form of hygiene and control of temperature, and in a somewhat random fashion, humidity. Ideally, this protective chain should include adequate cold-storage facilities at the slaughterhouse, suitable transport, cutting rooms under controlled air-conditioning, efficient cold-storage plant and, finally, suitable conditions of display. A sound understanding of the refrigeration conditions, the effect of these conditions on the changes occurring in the commodity, and an understanding of the commodity itself are necessary prerequisites for a more efficient and enlightened use of refrigeration."

● The chairman-elect of the Gas Council, Sir Henry Jones, has forecast that the construction of a national gas grid may be begun within a few years; the non-toxic, low-sulphur content product resulting could be delivered to area gas boards on terms against which local production could not compete.

Presumably, the consumer would be able to buy cheaper gas. Sir Henry suggested that appliances suitable for small households might have to be improved and gas tariffs would need careful consideration as the number of such households would grow for some 20 years.

● The sale of refrigerators to Eskimos, once a music-hall joke, is to-day a matter of normal business in Alaska, Arctic Canada and Greenland. In more remote regions the Eskimos still use the "original deep-freeze." In some regions covering many hundreds of thousands of square miles the ground has not been disturbed since the last Ice Age, as witnessed by the frozen carcasses of mammoth and Ice Age elephants found by gold miners in Alaska since the war. One such carcass of a baby Ice Age elephant "dating back 100,000 years or more," was largely intact, and is now on show in the New York Natural History Museum—in a glass-fronted display refrigerator. Thus it is easy to understand that the Eskimo finds no difficulty in accepting the refrigerator as part of his igloo's furnishings, keeping in it the meat of caribou and walrus, seal, polar bear, duck and geese, eggs and fish.

● In the less remote areas of Alaska and Arctic Canada Eskimos are being employed in the new uranium, copper and iron ore fields, in construction work at new civil airports and on the military radar chain that spans Canada's polar coast across the North Pole from Siberia. The Canadian Department for Northern Affairs is airlifting batches of Eskimo girls from the Arctic to Winnipeg for training as waitresses and canteen "hands"; sent back to their own land, they work at the new mining settlements and are quite accustomed to use commercial-sized deep-freezers. Eskimo men, earning good money in "the new Arctic," are inclined to relegate travel by dog-teams and buy the tracked vehicles called "bombardiers," selling at \$5,000, as a means of travelling their trap lines. And their wives, thumbing through Sears Roebuck catalogues, decide that a fridge is more desirable than a hole chopped in the frozen ground.

● Thus refrigerators are not uncommon in villages like Kotzebue (on Alaska's shores across frozen seas from Siberia), where the majority of Eskimos live in timber-built homes. Places like Aklavik and Tukuk in Canada's Western Arctic where it meets the Polar Ocean, enjoy electric power and the facilities it makes possible—electric irons, cookers . . . and refrigerators. The Eskimo woman with a fridge uses it with the nonchalance of an English housewife. Our correspondent states: "I have seen an Eskimo housewife pop seal meat into her fridge and remove milk for the baby and deep-frozen vegetables air-lifted in from 'the outside'—local vernacular for the rest of the world outside the Arctic." At one remote snow-house settlement, an Eskimo had a "fridge for four people" air-lifted to him from Toronto, a distance of 1,600 miles (at 7s. per lb. freightage). There is no electricity within 500 miles of his home; he uses his fridge as a cupboard in the winter, and the Eskimo's usual methods of keeping food fresh in summer. He says "Time don't mean anything up here." He can wait till electricity comes, when he'll switch his fridge on. It would seem that he has a long wait ahead of him. Meantime, his fridge makes a nice-looking cupboard!

Baker Perkins Ltd., announce that negotiations are in an advanced stage for the acquisition of the major part of the business of William Douglas & Sons Ltd., of Putney, London. The Baker Perkins Group will acquire the refrigeration, bulk handling and general engineering business of the Douglas company. A preliminary agreement has been signed providing for the

formation of a new subsidiary company—William Douglas & Sons (Engineering) Ltd. The assets used in the engineering activities of the present Douglas company will be transferred to the new one. After the formation of the subsidiary—and the completion of contracts—it has been agreed that Baker Perkins will acquire the total share capital of the subsidiary. The

purchase price of £260,000 will be satisfied by the issue of ordinary £1 shares of Baker Perkins. Douglas and Baker Perkins have been associated technically and commercially for some time. Many Baker Perkins plants in biscuit and other food factories incorporate Douglas equipment for the automatic handling in bulk of the fats and liquids used in production.

NEWS OF THE MONTH

Refrigeration and A-c. Exports.—During October 1959, air-conditioning and refrigerating machinery (commercial and industrial sizes) to the value of £817,722 weighing 1,176 tons, was exported from the United Kingdom. Comparable figures for October 1958 were 927 tons, worth £642,763.

Exports' Analysis.—Of the 1,176 tons of air-conditioning and refrigerating plant worth £817,722 exported by Great Britain in October—quoted in the preceding paragraph—130 tons went to the Union of South Africa, 66 tons to India, 57 tons to Australia, 34 tons to New Zealand, 24 tons to Canada, 162 tons to "other Commonwealth countries," 36 tons to Eire, 20 tons to Sweden, 299 tons to Western Germany, 29 tons to the Netherlands, 13 tons to Belgium, 16 tons to France, 7 tons to Italy, and 283 tons to "other foreign countries."

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigerating machinery during October, quoted in the first paragraph, commercial refrigerators accounted for 376 tons, worth £202,176, industrial plant and equipment for 196 tons worth £141,085, refrigerating equipment and parts, including parts of commercial refrigerators for 363 tons, worth £275,690.

Exports of Small Refrigerators.—During October, 1,148 tons of complete refrigerators and domestic

refrigeration equipment were sent overseas from Great Britain. These exports were worth £718,796. The 1,148 tons comprised 52 tons to the Union of South Africa, 17 tons to Rhodesia and Nyasaland, 3 tons to India, 71 tons to New Zealand, 564 tons to "other Commonwealth countries and Irish Republic," 32 tons to Sweden, 92 tons to Western Germany, 16 tons to the Netherlands, 17 tons to Belgium, 1 ton to Italy, and 283 tons to "other foreign countries."

"Ideal Home."—The *Daily Mail* Ideal Home Exhibition of 1960 will be held, as usual, at Olympia. It will open on March 1 and close on March 26. The main feature of the 1960 exhibition will be a Georgian house which will be built at the west end of the Grand Hall and approached by a formal drive through superb gardens. The house will be an authentic reproduction of the Georgian house of about 1720, the peak of our most beautiful architectural period.

Overseas Business.—The director-general, Supplies and Disposals, New Delhi, is calling for tenders for the supply and installation of equipment for a central dairy at the Government Milk Colony at Madhavaram. A rather unusual inquiry comes from Kuwait where Mohamed Hirbish, the Kuwaiti administrative assistant at the social affairs department of the Kuwait Government, has informed the British Political Agency at Kuwait that he would



Rayleigh Refrigeration Sales and Service Ltd., of Leigh-on-Sea, Essex, Marco distributors, are sponsoring a commercial refrigeration exhibition which has begun a tour of Great Britain. The first stage in a fully equipped coach is covering East Anglia on a two-months' itinerary. The second journey will follow a line from King's Lynn, Peterborough to Leicester. If all goes well it is their ambition to take the exhibition on a second coach to cover the Midlands, and in May/June next year, Rayleigh Refrigeration hope to take the coach over to the Continent, subject, of course, to E.T.A. and conditions prevailing at the time. Before going further into the latter scheme they made sure Air Charter Ltd. would be able to accommodate the exhibition coach as the enclosed photograph taken at the Southend Airport shows.

like to incorporate a United Kingdom manufactured central air-conditioning installation in a new house which he is building for himself and his family. The house will need to be air-conditioned throughout. It is thought that securing of this contract, though small, may lead to good business in this area which is experiencing a boom in building, particularly if speedy delivery is effected.

Interfrigo's First Decade.—Interfrigo, the international railway-owned company which specializes in refrigerated transport of perishable foodstuffs, has now been in existence for 10 years, and the success of the company in this period has exceeded the most optimistic estimates. Interfrigo traffic increased from 21,000 refrigerated and insulated wagon loads in 1951 to 70,000 in 1958, and it is estimated that this year's total will be 85,000 wagon loads. Thus it has achieved a pre-eminent position in the international transport of perishable foodstuffs, principally bananas, dairy produce, fresh fruit and meat. The company has a fleet of 900 wagons equipped with the latest technical devices including electrical ventilation, and 300 new vehicles are under construction in Italy. In addition, it operates in international traffic over 10,000 refrigerated wagons belonging to its member administrations and their subsidiaries. The company has its general management in Basle and its registered offices in Brussels. It consists of the founder administrations, namely the railways of Belgium, France, Great Britain, Holland, Italy, Switzerland and Western Germany together with the railways of Greece, Luxembourg, Spain and Turkey, which have joined subsequently. Interfrigo has also concluded agreements with most other European railway administra-

tions, so that its sphere of activity extends practically throughout the whole of Europe where it has representatives in each country.

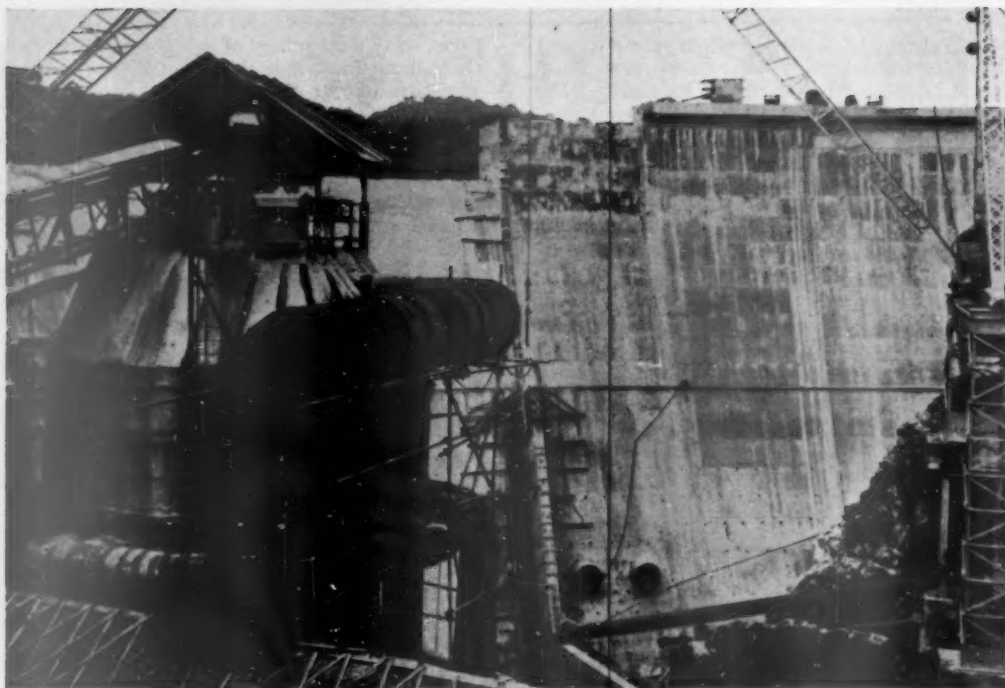
Vast Pre-Cooling Plant.—Aircro Engineering Ltd., refrigeration manufacturers of Durban, Natal, South Africa, have been awarded by the South African Railways and Harbours a £228,000 contract for pre-cooling equipment to be installed at Durban docks in connexion with a new shipping terminal now under construction. The project will save Natal fruit farmers from railing fruit a further 1,100 miles to Cape Town, where the Union's main refrigeration depot is installed. Bananas, citrus fruits, and pawpaws are Natal's main fruit products. The new depot will have 54 cooling tunnels, each able to hold 81 cubic tons of fruit. It is anticipated that 900 tons of refrigeration will be needed daily when the plant is working to capacity. In conformity with present-day industrial practice in South Africa, most of the materials needed for the plant would be obtained locally instead of from abroad. However, high-speed centrifugal compressors will have to be obtained from the U.S.A. The new plant, expected to be ready by early in 1961, will have a total floor space of 225,000 sq. ft. Managing director of Aircro Engineering Ltd. is Mr. C. A. Christerson.

Lec Refrigeration Limited has taken delivery of a new power press for which they have waited two years. The press weighs 75 tons, and exerts a pressure of 500 tons; it will enable Lec to manufacture their own large refrigerator door panels in one operation, which have to date been made in the Midlands.

PICTURE of the Month ★

The pictures illustrate 45 years progress in domestic refrigeration—indeed, they show, left, the first household electric refrigerator ever made, by Kelvinator's in 1914 and, on right, the same firm's first self-contained cabinet produced in 1925. The luxurious 1960 model, centre, is the Foodarama, most expensive in Kelvinator's range. The anniversary referred to was celebrated in London last month (see page 1067).





The partially completed dam is shown beyond the lagged hoppers of the batching plant.

REFRIGERATION IN DAM CONSTRUCTION

THE recent completion of the Klang Gates Dam project, Kuala Lumpur, Malaya, marks the first phase of a vast scheme to prevent water shortage during drought and floods during the rainy season. Designed by the U.S. Bureau of Reclamation and built by the Public Works Department of Malaya at a cost of over £1,600,000, the dam will impound 4,000,000,000 gal. of water in a lake covering 750 acres of forested valley.

More than 100 ft. high, with a crest length of 450 ft., the dam is expected to provide both Kuala Lumpur and Petaling Jaya with 32,000,000 gal. per day during dry spells. Experts believe that the scheme will cope with water needs up to 1972.

Actual construction took three years, the placing of the concrete alone occupying 17 months. A special feature in the engineering techniques employed was the method adopted for lowering the temperature of the concrete.

Hot Weather Problems

The placing of large concrete masses under tropical or semi-tropical conditions presents special problems

of linear thermal expansion. High temperatures result in more rapid hydration of cement, increased evaporation of mixing water, and reduced strengths and larger volume changes. If no attempt is made to control or eliminate these conditions, flaws and defects may result, among the most serious being a tendency to crack before hardening is complete.

Various methods have been employed and investigated to effect an efficient form of temperature control under such conditions. These have included the placing of chilled water-carrying pipes actually within the concrete mass during construction, a method used in the great Hoover dam project in the United States; the addition of calcium chloride to prevent weakening; and the cold storage of aggregates. This latter method would normally necessitate two sets of storage bins, the one cooling while the other was feeding the mixing plant.

In consideration of these problems in the construction of the Klang Gates Dam, York Shipley Ltd., the industrial refrigeration engineers, worked in conjunction with Blaw Knox Ltd., the main contractors responsible for the supply of the concrete mixing

plant, in producing a plant for the pre-cooling of the concrete by the circulation of refrigerated air through the aggregate, the chilling of the water and the addition of flake ice during mixing.

Cooling Requirements

The refrigeration plant had to be designed for a concrete placing temperature of 48° F. in conditions where the ambient temperature averaged 85° F. The temperature of the cement, sand and stone was 85° F., and the feed water was 80°. The output of concrete was to be 22 c.yd. per hour over a 12-hour working day.

Four separate refrigeration plants were selected: (a) air cooling for aggregates; (b) water cooling; (c) ice manufacture and (d) ice storage.

The method of cooling the aggregate was to supply cold air at 35° F. to the four compartments of the batching tower which held the graded gravel, separate fans of centrifugal pattern delivering the air through cooling coils placed in the respective delivery ducts. Further ducting from the top of the tower returned the air to the fan suction chamber. Cork insulation was provided to all ducting.

The refrigeration plant to work in conjunction with the air-cooling coils for this duty comprised two York 9-in. bore by 9-in. stroke vertical single-acting enclosed ammonia compressors vee belt driven by 110-h.p. slipring motors; shell- and tube-type refrigerant condenser; high-pressure receiver and two centrifugal condenser water circulating pumps.

The aggregate storage bin, designed and built by Blaw Knox Ltd., was divided into six compartments: two of 50 c.yd. capacity each for sand and $\frac{3}{4}$ -in. aggregate, three of 33 c.yd. each for 1½ in., 3 in.,

and 6 in., and one centrally placed circular section capable of storing up to 50 tons of cement. This storage capacity was calculated to ensure that the coarse aggregates had a minimum of 90 minutes' exposure to refrigerated air. The bin was insulated by two layers of 3-in. slab cork.

Water Cooling

For feed-water cooling a Baudelot chilling system was provided. This comprised a galvanized steel tank over which was mounted a galvanized steel cooling coil. Water was pumped from the source to the storage tank and circulated by a small vertical spindle pump over the cooling coil. A transfer pump of 40 gal. per minute capacity pumped the chilled water to the concrete batching tower. The refrigeration plant included a York 5-in. by 5-in. compressor, and necessary ancillary equipment.

Further cooling requirements were met by the addition of ice in ribbon particle form. This was manufactured by four York model DER 25A flake ice-making machines; adequate ice storage facilities were provided, a fully automatic flake ice store being constructed below the ice-making plant.

For the transfer of flake ice to the batching tower, a screw conveyer was fitted under the ice store, feeding a bucket elevator. This discharged over a balanced hopper which, in turn, charged a weigh hopper below. Finally, the ice joined the aggregate and cement in a common collecting hopper for all weighed material. At all stages of ice handling cork insulation was provided.

Operation of the Batching Plant

Gravel produced locally was elevated to the top of

Plant room for the York, model DER 25A, flake ice-making machines with ice store below is shown underneath the main batching plant conveyer.



the batching tower by 72 ft. centres inclined troughed belt conveyer, a swivelling turnhead directing the material to the appropriate compartment. Cement, delivered at ground level into a shallow hopper, was blown into the storage compartment by compressed air.

Under each aggregate compartment a pneumatically operated radial gate controlled the flow of material to two weigh hoppers. Cement discharge was through a Blaw Knox cement valve into a separate weigh hopper.

The chilled water was accurately measured in a

volumetric header tank and discharged into the mixer by pneumatically operated valves.

All discharge, weighing and mixing operations were remotely controlled from a desk-type, push-button panel, conveniently placed to give the operator a full view of the weighing dials.

The concrete was mixed in a large capacity electrically driven, tilting-drum mixer situated below the operator's platform, and discharged into bottom discharge crane skips drawn beneath the plant on rail mounted trolleys. It was finally placed by derrick cranes.

Air-Conditioning British Automobiles

THE importance of export markets to British car makers has prompted at least two of them to provide full air-conditioning plant as an optional extra on certain models.

The recent annual show of The Society of Motor Manufacturers and Traders gave one the chance to discuss the design of this equipment with the manufacturers concerned.

If the high ambients of summer, 1959, are repeated one imagines that business done in air-conditioning plant for automobiles will not be confined to overseas markets.

As many readers will probably have noticed, Rolls-Royce Ltd. have already advertised the benefit of full air-conditioning in announcements in the national Press. Refrigeration plant is an optional extra, and provision is made in the air-conditioning unit for the evaporator. The whole assembly, excluding compressor and condenser, is now mounted under the right front wing above and behind the wheel, and so the components of the refrigeration circuit no longer occupy any of the rear boot space. Basically the refrigerator system is a vapour cycle circuit with a straightforward series layout of engine-driven compressor, condenser and evaporator; "Freon-12" is the refrigerant. The compressor is belt-driven through a magnetic clutch.

Apart from the fact that the basic elements do not occupy useful space in the car, the most important feature of the new air-conditioning is that a split air system is used. One supplies fresh air from the front of the car, and the other recirculation of the air already inside. By means of two facia controls, the balance between these is adjusted.

In the fresh-air circuit, the intake is from the grille at the right-hand side of the radiator to a nylon filter and two-speed fan; ram effect assists flow at high speeds. Through polythene trunking air passes to an

electrically-operated, control valve which can be selected to direct the flow through the heater, or the evaporator when the refrigeration unit is fitted. The air is then directed to three slots along the lower edge of the windscreen, and two on the facia panel. These are provided with adjustable deflectors for directing the air to the face if desired or, if need be, to demist the side windows.

For the recirculatory system, the intake is on the floor just behind the front right seat. The air is passed in turn through a nylon filter, two-speed motor, and, to choice, the evaporator or lower part of the heater matrix in this secondary circuit to the body sides. There are two exits on each side near the front passenger's feet, and one on the left side in the gap between the door and the seat. A pull-out drawer beneath the facia can be used to direct air over the top of the seats for the benefit of the rear passengers when refrigeration is fitted; it is not used on the standard system.

By means of the two facia controls a very wide range of conditions can be chosen. A degree of dehumidifying can be achieved by passing the recirculating air through the heater side of its system and mixing it with a cool charge on the fresh-air side. With full refrigeration, 50 to 60 lb. is added to the weight, and cars fitted with refrigeration have additional roof and exhaust system insulation.

The Phantom V and Continental Bentleys retain the previous refrigeration layout designed for boot mounting. For the former this is because the conditioning is naturally concentrated on the rear passengers' compartment rather than that of the chauffeur, while in the case of the Continental the more compact frontal area precludes the use of the under-wing unit.

A recent demonstration in a new vee-eight Rolls-Royce with full air-conditioning, showed that an ambient temperature of 70° to 75° can be pulled down

to a chilly 55° inside the car in about 10 minutes, even though a high proportion of outside air is being admitted to keep the car fresh.

Turning now from the luxury-class car to the family type of saloon, it is interesting to find that an air-conditioning plant has been developed for the £800 Hillman Minx and for the Rootes Group's other, and rather more expensive, model the Sunbeam Rapier.

"The real joy of air-conditioning for cars comes after you have had to park (with windows shut and doors locked) in blazing sun," wrote Joseph Lowrey, B.Sc. (ENG.), in a recent issue of *The Motor*. "In those sort of conditions, with a Hillman Minx standing in our London office car park, a thermometer mounted outside the windscreen gave readings of between 100° and 104° F., whilst another thermometer inside the car gave readings of between 100° and 110° F. By starting the engine and switching on the engine-driven refrigerator this car could quickly be cooled down. The cool air is blown from the back of the car, but a thermometer away forward on the fascia panel would drop 21° in five minutes, another 12° in five further minutes, and yet another 5° in five more minutes. From 100° F. the temperature in the front of the car in fact sank to 79° after five minutes, to 67° after 10 minutes and to 62° after 15 minutes with the engine idling. Apart from actual testing, we normally got back into the car and drove off after the first few minutes of refrigeration had reduced the interior temperature to a habitable level—drove off with all or almost all the windows closed, to the astonishment of everyone else around.

"On the Minx installation the 'Freon' compressor

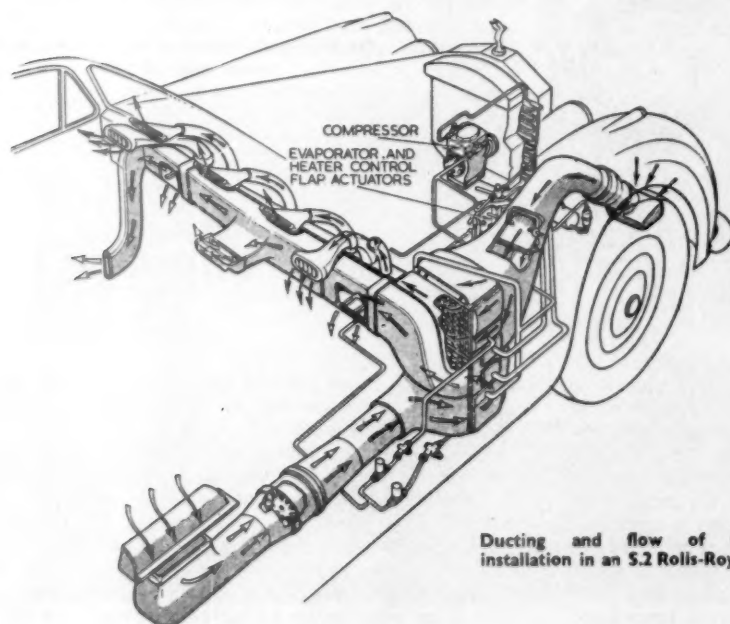
is neatly accommodated, and so is the condenser although its concealed presence behind the radiator grille prevents the starting-handle being used in a tired-battery emergency. The refrigerating half of the system occupies a small part of the luggage locker, and includes a three-speed air-circulating fan for blowing cooled air out of slots just below the rear window—we proved that you can freeze 'soft' drinks into hard ice on the rear parcel shelf, but a hinged air deflector blows the chilled air upwards instead of forwards when rear-seat passengers are being carried.

"Switched off, the air-conditioning system consumes no power but adds weight to the car—this Minx weighed 2,373 lb. with full tanks as against our last road test weighing of an uncooled example at 2,275 lb., so you accelerate and carry up hills extra weight equivalent only to 7 stone—although, as the 5 per cent. of extra weight is at the ends of the car, it makes steering perceptively less responsive for sudden swerves.

"On the road, I would venture the opinion that only very discerning motorists would notice the 10 per cent. loss of top-gear acceleration, or a 2-m.p.h. diminution in the near-80 m.p.h. maximum speed of a Hillman Minx," concluded Mr. Lowrey. "The fuel consumption figures I found especially interesting, and at first I was surprised to find a 13 per cent. increase at 30 m.p.h. shrinking to one of 6 per cent. at 50 m.p.h. and to only 5 per cent. at 70 m.p.h.; then I converted the m.p.g. figures into pints of petrol per hour, and made the discovery that, almost regardless of how slowly or fast you drive, using the air-conditioning involves something very close to 0.111

gal. per hour extra petrol consumption. To get nine hours of air-conditioned comfort at a running cost of 4s. 9d. for a gallon of petrol, say, 6½d. per hour, is not exactly an extravagance."

For an overseas visitor who takes delivery of his new Hillman Minx in England, this Rootes-built air-conditioning installation puts up the basic price of his car by £120.



Ducting and flow of the installation in an S.2 Rolls-Royce.

REFRIGERATION IN AERONAUTICS—

The article with the above title, which appeared in our October issue, has prompted two firms in the aircraft industry not mentioned in the first instalment to send us particulars of their plant.

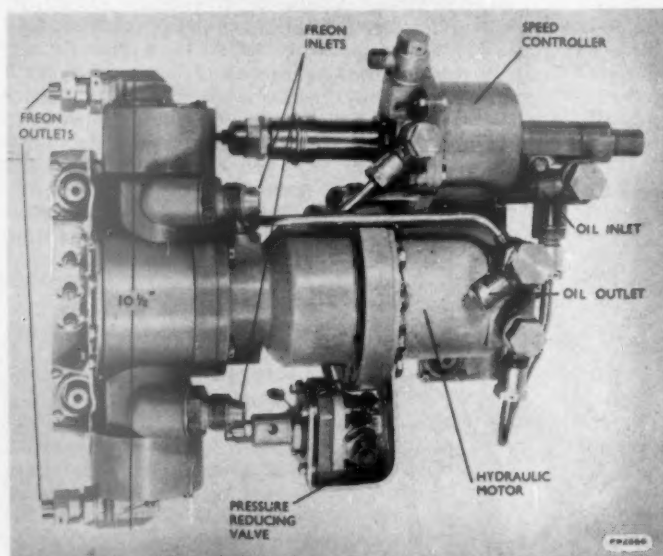
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“UNTIL comparatively recently the simplicity and lightness of the air-cycle system for cooling cockpits, cabins and equipment has led to its almost exclusive use on both military and civil aircraft, irrespective of whether the air source has been the engine compressor or a mechanically driven cabin blower. In general such systems have been able to satisfy the standard of air-conditioning demanded,” write de Havilland Propellers Ltd. “However, the

possible to extract a high proportion of moisture from the air by cooling it to very near the freezing point.

“It is, of course, also possible to use a vapour-cycle system for direct cooling of electronic apparatus and other equipment : this application has been employed for missiles.

“Two typical examples of the applications of vapour-cycle cooling are for the air-ventilated suit system on military aircraft, and for the cabin con-



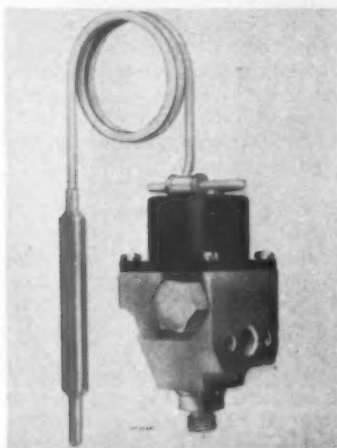
De Havilland's hydraulic motor driven compressor type CR.01-00.

more exacting demands made on cooling systems to meet certain current requirements have been beyond the capability of the pure air-cycle system : this has forced designers to adopt a vapour-cycle cooling system. One of the main advantages of such a system is its ability to cool the flow of air to the cabin independently of the pressure at which this air is supplied : in contrast, an air-cycle refrigeration unit needs for the required standard of cooling both a source of air at a pressure, and a pressure drop across the unit, which are not always available. Of equal importance is the fact that the vapour-cycle system makes it

ditioning on those types of civil aircraft which have to operate under conditions of high humidity and high ambient temperature.

“In the case of a fighter aircraft the ventilated suit worn by the crew members has to be supplied with air within specific temperature limits and must not contain more than a limited amount of moisture. Under engine idling conditions the pressure of the air bled from the engine compressor is sufficient to produce the requisite degree of either cooling or water extraction when using an air-cycle system : with a vapour-cycle system, however, both requirements can

be satisfied. The cooling load for such an application is under 100 B.t.u./min. per person and a small reciprocating or positive-displacement compressor can



De Havilland's thermostatic expansion valve type CV19-0.

be used for pumping the refrigerant through the vapour-cycle system.

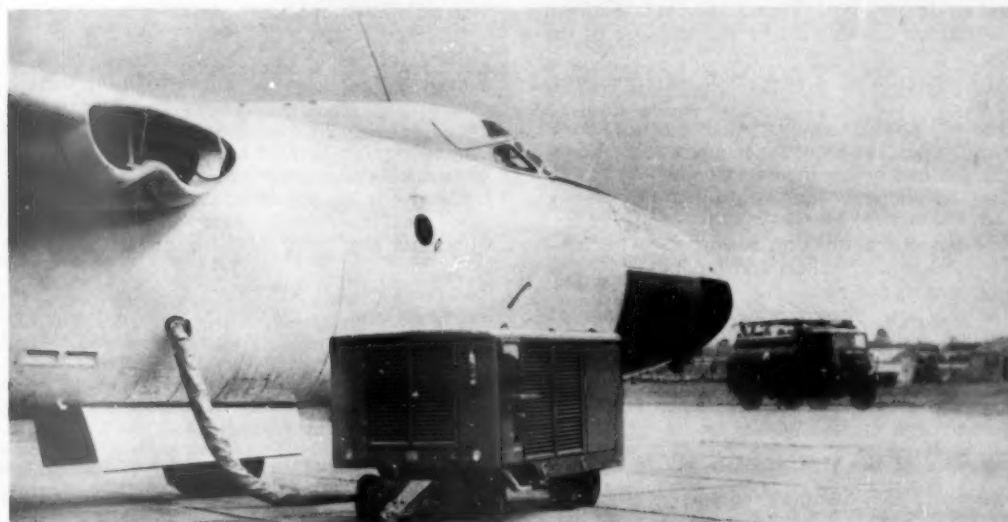
"One of the major problems of air-conditioning civil aircraft in hot and humid conditions is the removal of moisture to keep the cabin humidity down to a comfortable level. This can be achieved very effectively by recirculating the cabin air through a heat exchanger, through the other side of which a vapour-cycle refrigerant is passed, thus lowering the air temperature to just above freezing point and

thereby extracting much of the moisture. Some of the fresh air supply to the cabin also passes through this heat exchanger, where it is similarly cooled and partly dried. The cooling demand in these circumstances is quite considerable, being of the order of 10 tons of refrigeration for 75 passengers, and for such loads a two-stage centrifugal compressor would be used.

"De Havilland Propellers Ltd. entered the field of vapour-cycle air-conditioning early in 1958 when a complete system for conditioning the air supply to ventilated suits on a fighter aircraft was designed. This equipment has already undergone its first flight trials, both in this country and in the tropics, under operational conditions. A further and more comprehensive test programme will begin shortly. This system uses dichlorodifluoromethane refrigerant."

The de Havilland reciprocating "Freon" compressors have been developed primarily for use in aircraft and missile refrigeration systems. Whereas it has been universal practice to lubricate bearings and rubbing surfaces in "Freon" compressors, either by splash from a wet sump or by mixing a proportion of oil with the "Freon," these particular compressors are designed to run "dry" by using sealed bearings charged with a lubricant, and by employing for the rubbing surfaces materials which need no lubrication. The object of this is to eliminate oil separation problems which can prove serious, even under fairly normal operating conditions met by military aircraft, and to avoid any detrimental effects due to oil films on heat transfer surfaces and on the drying agent. It also eliminates any possibility of erosion damage to the seating in the thermostatic expansion valve due to minute droplets of oil.

These compressors are horizontally opposed single-stage machines having pistons operating 180° out of



M. L. Coolair Mk. 5 air-conditioner serving Valiant aircraft.

phase off a single-throw crankshaft. This arrangement was chosen as it allowed the use of a simple crankshaft combined with reasonable driving torque characteristics. The crankshaft is carried by one ball and one roller bearing; a Dunlop rubber coupling transmits the drive from the motor. The pistons run in steel liners and the inlet "Freon" gas flows through an annulus around the liners thus providing cooling for the piston skirts. As the temperature of the "Freon" gas entering the compressor is in the region of 10° to 15° C. the cylinder liners are kept reasonably cool and can provide adequate cooling for the piston skirts and rings. The inlet ports are situated in the liner flange and the outlet ports are in the cylinder head. Two sizes of compressor are at present in production each available with several alternative methods of drive.

The aircraft we illustrated in our October issue, the Handley Page Victor, is, in fact, air-conditioned with de Havilland equipment.

M.L. Aviation Co. Ltd., of White Waltham (briefly mentioned in October) produce a range of portable air-conditioning plants for cooling aircraft on the ground. Their Coolair mk. 5 self-contained air-conditioner has been developed for cooling the interior and equipment of V-class bombers on the ground. Filtered and cooled air is delivered through flexible hose supplied with connectors which couple to the aircraft ground connexions in order to cool (a) the aircraft cabin (b) the "black box" radar equipment, and (c) the radio scanner in the nose of the aircraft. Air is drawn through a filter into the unit by a centrifugal fan and passes via the evaporator, or cooling chamber, of a refrigeration plant, which reduces the temperature of the air before it is delivered to the aircraft.

The unit is powered by a Ford industrial petrol engine which simultaneously drives the refrigeration plant and air delivery fan. The equipment is mounted on a six-wheeled towable trailer and consists of the following:—

(a) The power unit, clutch, radiator, generator, battery, etc.

(b) The refrigeration equipment, comprising compressor, air-cooled condenser, oil separator, liquid receiver, drier and control valve systems.

(c) The air delivery fan with inlet air-cleaning filter.

(d) The power transmission consisting of pulleys, Vee belting, tensioning rollers and layshaft.

(e) Instruments and controls.

(f) Delivery hose, plenum box adapters and curved outlet adapter.

Each item of equipment is accessible from the outside for maintenance and servicing by means of

hinged access doors or removable panels. For major overhaul the canopy can be lifted complete from the equipment.

The total air delivery output of the mk. 5 is 100 lb. or air per min. against 15 in. water gauge back pressure. The nominal cooling capacity is 120,400 B.t.u./hr. The extraction of heat from the air delivery, however, depends on the ambient conditions of temperature and humidity at the time of operation. The table below shows the performance of the M.L. Coolair mk. 5 under test conditions of temperature, humidity, and air delivery.

Specification

Airflow:—

Duct 1 (scanner) ... 10 lb./air per min.

Duct 2 (cabin) ... 45 lb./air per min.

Duct 3 (black box) ... 45 lb./air per min.

Total air intake ... 115 lb./air per min.

Total head measurement:—

At 82° F. ambient ... 15 in. w.g. (0.54 lb./sq. in.).

120° F. ambient ... 13 in. w.g. (0.47 lb./sq. in.).

Cooling output (at 100 lb./min. air delivery):—

Ambient

110° F. 29% R.H. 120,400 B.t.u./hr.

85° F. 40% R.H. 88,800 B.t.u./hr.

Length ... 9 ft. 11 in.

Width ... 5 ft. 2 in.

Height ... 5 ft. 3 in.

Delivery hose ... 1 off 2 in. diam. hose 15 ft. long (scanner).

2 off 5 in. diam. hose 25 ft. long (cabin and black box).

Tyre pressure ... 90 lb./sq. in.

Petrol tank capacity ... 22 gal.

Engine lubricant ... Vignol New D20 (or any S.A.E. 20 grade).

Refrigerator compressor

lubricant ... Shell Clavus 33.

General lubricant ... Shell Alvania grease 3.

Refrigerant ... Dichlorofluoromethane

Duty

Engine ... 40 b.h.p. at 3,000 r.p.m.

Transmission ... 40 b.h.p. at 1,530 r.p.m.

Delivery fan ... 2,000 c.f.m. at 3,000 r.p.m. at 23 in. w.g. Max. absorbing 12.5 b.h.p.

Condenser fan... 12,000 c.f.m. at 880 r.p.m. absorbing 2.9 b.h.p.

Compressor ... 485 r.p.m. absorbing 21 b.h.p.

Refrigeration ... 129,000 B.t.u./hr. (10 tons) nominal at 110° F. d.b. 30% R.H. ambient.

Chassis ... 3 ton—towing speed, 15 m.p.h.

Performance of the M.L. Coolair Mk. 5 under test conditions of temperature, humidity and air delivery

Ambient temperature	R.H.	Engine R.P.M.	Engine oil pressure	Condenser gauge pressure	Evaporator gauge pressure	Air delivery	Air delivery temperature
65° F.	100%	3,000	50 lb. sq. in.	140 lb. sq. in.	35 lb. sq. in.	100 lb. per min.	44° F.



Kelvinator's 1960 Range of Refrigerators and Home Freezer

November, 1959, was a very special month for Kelvinator Limited, for not only did they "launch" their 1960 range of domestic refrigerators at the Park Lane Hotel, Piccadilly, but they celebrated the 45th anniversary of the production of the first successful household 'fridge—a Kelvinator model made by Nathaniel B. Wales in Detroit in 1914. Incidentally, it is believed that the presentation of a whole range of new refrigerators from 4 c.ft. upwards on the same day creates a record in post-war marketing of these appliances in Britain. Mr. N. F. T. Saunders, managing director, and Mrs. Saunders, together with Mr. Duncan Welch, domestic sales manager, received nearly 150 editors of the national, "glossy", and technical press at the "unveiling."

KELVINATOR introduced last month a completely new range of refrigerators and a home freezer. Styled in the new, clean-line or square-cut look, the complete range comprises cabinets of 4.6, 6.0, 7.7, 9.4, 13, and 18 c.ft. capacities. There is also a new vertical home freezer of 10 c.ft. The latter three models are being imported from Kelvinator, United States.

This new range, following the Kelvinator tradition, is designed to offer maximum internal capacity for floor area occupied. This is a selling point frequently stressed by manufacturers; Kelvinator support their claim by inviting study of actual dimensions.

All the cabinets in the new range are designed so that their doors open within the width of the cabinet. They may therefore be installed right next to, or flush with, other kitchen equipment.

Said to be the first time that a British refrigerator manufacturer has offered a completely new range of cabinets at one time, Kelvinator are repeating their successful 4.6 c.ft. table-top model, the K46MT, restyled to suit the new range. It is priced at £70 7s.

All the new British Kelvinators above 4.6 c.ft. capacity are equipped with an extra-low-temperature freezer, with temperatures which permit long storage of frozen food and the freezing of garden produce. The 6.0 c.ft. (K60M) is a cabinet of medium size which incorporates all those features normally associated with larger cabinets. It is anticipated that this cabinet will satisfy an important

section of the market not yet properly exploited in this country.

Sufficiently compact for installing in a small kitchen, it offers a large storage capacity on a floor area equal to that occupied by many of the smaller refrigerators on the market. Priced at £84, it is expected to secure a warm reception from dealers.

The next new model in this range is the Kelvinator K77M of 7.7 c.ft. capacity. Again, this is equipped with an extra-low-temperature freezer chest. It provides ample refrigeration for the larger family, yet there is still a width of only 24 in. This is a luxury refrigerator but it is priced at £109.

The largest British Kelvinator is the K94M of 9.4 c.ft. capacity; it has a capacious extra-low-temperature freezer chest and is priced at £125. Also with a width of only 24 in. it is designed to fit into the usual British kitchen where space is at a premium.

The K94MD is a similar cabinet, but it incorporates the famous Magic Cycle automatic defrosting system exclusive to Kelvinator. With this system it is only necessary to press the defrost button, without removing any of the contents of the refrigerator, to achieve a rapid and automatic defrosting. These *de luxe* models have shelf area of 13 sq. ft. The K94MD is priced at £135.

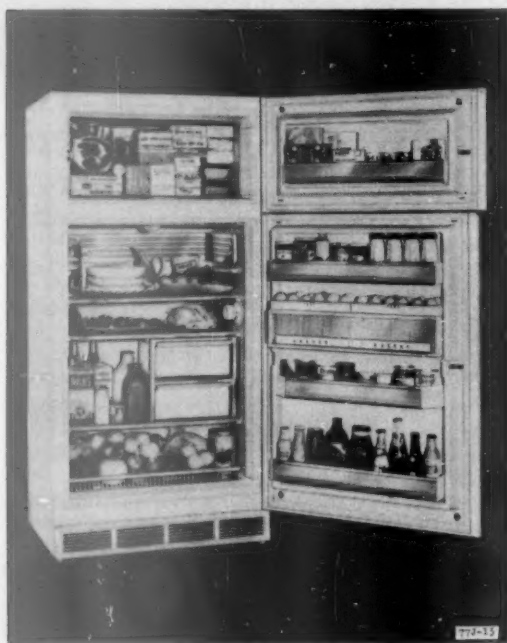
* Kelvinator this year are increasing their range by importing from America a two-door refrigerator freezer of 13 c.ft. capacity, the K77J13. This is priced at £265. This model

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can be regarded as almost the ultimate in refrigeration luxury. Despite a price which is high for the British market, surveys have already indicated that there is a strong minority public who favour this type of refrigerator.

"The final word in refrigeration" claim Kelvinator is the Foodarama which is no stranger to this country. It has a storage capacity of 12 c.ft. and a deep-freeze capacity of 6 c.ft. There again, market surveys indicate that although this model has a price of £440 15s. 11d., the Foodarama will be welcomed by a very important, if restricted, section of the public.

Kelvinator complete their 1960 range with a vertical deep-freeze cabinet of 10 c.ft., the KVV-10. It is expected that this cabinet will be welcomed by the trade as a fully proved appliance for buyers who demand plenty of capacity for the storage of frozen foods. It is priced at £164.



Kelvinator's 13.1 c.ft. model.

The following details highlight special features of the various Kelvinator models:—

1. Table-top model K46MT

Retail price : £70 7s. 0d. including purchase tax of £10 9s. 9d.

Kelvinator table-top model with 4.6 c.ft. capacity and a shelf area of 7½ sq. ft. This compact table-top provides great internal space, yet is ideal for the really small kitchen where space is at a premium. In white or champagne ivory.

Features include:—

- Table-top heat- and stain-resistant, non-chipping Waverite.
- Freezer compartment for ice and frozen foods.
- Moisture-seal crisper to keep fruit and vegetables garden fresh.
- Complete dairy compartment in door for easy-reach storage.
- Butter and cheese in divided compartment.
- Tall bottle storage in door for wine, milk, etc.
- Interior light.
- Plastic inner liner for easy cleaning and long life.

2. Model K60M

Retail price : £84 0s. 0d. including purchase tax of £12 11s. 11d.

Although no bigger externally than many 4-c.ft. refrigerators, the K60M has 6 c.ft. refrigerated space. It has an extra-low temperature freezer chest for freezing garden produce, and cold storage facilities for the average household. Shelf area is 10.3 sq. ft. White or champagne ivory.

Features include:—

- Frozen food chest. Extra low temperature for long-term storage of frozen food and freezing garden produce.
- Chill tray for chilling meat and fish.
- Moisture-seal crisper to keep fruit and vegetables garden fresh.
- Plastic inner liner for easy cleaning and long life.
- Dairy compartment in door. Large capacity.
- Butter and cheese in separate compartments.
- Tall bottle storage in door.
- Interior light.
- Fruit and vegetable rack for cold storage of packaged or polythene-wrapped goods from shop or supermarket.

3. Model K77M

Retail price : £109 0s. 0d. including purchase tax of £16 7s. 8d.

This is a capacious refrigerator with every tried and proved feature used in domestic refrigerators. It has 7.7 c.ft. capacity and a shelf area of nearly 12 sq. ft. It has an extra-low-temperature freezer chest to take 48 lb. of frozen food, ice-cream, etc., and two ice trays. With its beautiful styling and efficient design this is the cabinet for the rather larger household. In white or champagne ivory.

Features include:—

- Floor area occupied is only slightly larger than most of the smallest refrigerators on the market.
- Frozen-food chest. Extra low temperature for long-term storage of frozen food and freezing garden produce.
- Chill-tray for chilling meats and fish.
- Moisture-seal crisper to keep fruit and vegetables garden fresh.
- Plastic inner liner for easy cleaning.
- Dairy compartment in door. Large capacity.
- Butter and cheese in separate compartments.
- Tall bottle storage in door.
- Interior light.
- Fruit and vegetable rack for storing packaged or polythene-wrapped goods from shop or supermarket.
- Two egg racks.

4. Model K94M

Retail price : £125 0s. 0d. including purchase tax of £18 14s. 0d.

5. Model K94MD

Retail price : £135 0s. 0d. including purchase tax of £20 4s. 11d.

The K94MD is fitted with the famous Magic Cycle automatic defrosting system exclusive to Kelvinator. One presses the button to defrost without removing contents. With capacious extra-low-temperature freezer chest—holding 32 lb. of frozen food, etc., it has a huge interior capacity of 9.4 c.ft. In white or champagne ivory. These *de luxe* models have a shelf area of over 13 sq. ft.—equal to the area of a large family dinner table.

Features include:—

- Floor area occupied very slightly larger than most of the smaller refrigerators on the market.
- Magic Cycle automatic defrosting on model K94MD (press-button system on model K94M).
- Frozen-food chest. Extra low temperature for long-term storage of frozen food and freezing garden produce.
- Chill tray for chilling meats and fish.
- Moisture-seal crisper to keep fruit and vegetables garden fresh.
- Plastic inner liner for easy cleaning.
- Dairy compartment in door. Large capacity.
- Butter and cheese in separate compartments.
- Tall bottle storage in door.
- Interior light.
- Fruit and vegetable rack for storing packaged or polythene-wrapped goods from shop or supermarket.
- Two egg racks.

6. Model K77J-13

Retail price : £256 0s. 0d. including
purchase tax of £38 12s. 9d.

This is a large two-door combination model of 13.1 c.ft. capacity with 100 lb. food freezer included.

Features include :—

A separate refrigerator that allows for food storage without cover.

Automatic defrosting.

Waist-level stocked porcelain "crispers" for fresh fruit and vegetables.

A miniature package pantry.

Double 12 by 12 portable egg trays.

Twin butter and cheese chests.

Food freezer is separately insulated and refrigerated.

Two ice trays and a choice of exterior colours.

7. Domestic Home Freezer, model KVJ-10

Retail price : £164 0s. 0d. including
purchase tax of £24 14s. 7d.

This refrigerator has the exclusive "space engineered" design, and has a capacity of 10 c.ft.

Features include :—

Three fast-freezing shelves and a refrigerated top plate.

It also has a built-in door lock as well as a safety door latch.

8. Kelvinator Foodarama

Retail price : £440 15s. 11d. including
purchase tax of £67 9s. 10d.

It is a 12 c.ft. refrigerator with, in addition, a 6 c.ft. upright freezer. An all-in-one cabinet only 41 in. wide, 63 in. high and 25 in. deep.

Features include :—

A *de luxe* automatic defrosting refrigerator with a capacity for 207 lb. of frozen food.

Full-size shelves.

Package pantry.

Butter and cheese chests and a cold-mist freshener.

A single refrigerating unit cools both the refrigerator and the freezer and allows exceptional efficiency and low-cost operation.

Hotpoint's Biggest Conference

A.E.I.-Hotpoint Ltd. brought their 1960 sales and advertising programme, their biggest ever, to the notice of their trade customers with powerful impact when they received 250 Hotpoint dealers from all over Britain at Brighton on November 10 to 11. Met at Victoria by a team of 12 smartly-uniformed Hotpoint hostesses, the party joined a special Pullman train on which lunch was served during the journey. At Brighton a fleet of coaches conveyed them to the Metropole Hotel, where the Clarence Room had been transformed into a comfortable and softly-lit theatre for the occasion.

Welcoming the company's guests, Mr. R. Craig Wood, managing director, said: "We are indeed grateful to you for sparing your precious time to join us here. We are particularly grateful because we regard you as very important people to our business. We hope that you, in turn, feel that Hotpoint is important to your business, and that by getting together here we can all strengthen and improve our business and our common interests."

Explaining that Hotpoint were doing everything possible to make their appliances available in maximum quantities, the company's general marketing manager, Mr. C. A. Ganderton, referred to extensions and yet more extensions to the Llandudno and Peterborough factories and to increased production capacity at Birmingham.

The marketing presentations talks on the home laundry

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and portable appliances were followed by the introduction of the 1960 "Iced Diamond" refrigerator, by Mr. John Parkin, refrigerator marketing manager. Mr. J. D. Lake, general sales manager, briefly summed-up the afternoon's activities to conclude the programme.

The principal public rooms had been converted into exhibition and stock rooms for the occasion, and following the presentations the dealers were able to renew their friendly contacts with the Hotpoint salesmen and district managers from their territories.

A reception in the evening was followed by a formal dinner and a cabaret.

New Italian Models

J. & D. CLAYTON (Imports) LTD.,* of 128, High Street, Edgware, Middlesex, are now marketing the Yuman range of domestic refrigerators.

The full range—from table-top size (capacity 4.7 c.ft.) to the largest (capacity 8.2 c.ft.)—each include features such as the automatic press-button defroster and a deep-freeze department in which it is claimed the temperature can be held at zero degrees, never before available in a full range in Great Britain. All refrigerators are priced well within reach of the average household at a price which competes favourably with any other refrigerator approaching their standard. Every refrigerator is guaranteed for five years and free service is provided by Home Maintenance Ltd., one of the E.M.I. companies.

The automatic defroster operates on the simple pressure of a button—it defrosts and starts to freeze again quite automatically by itself. The deep-freeze compartment maintains zero degrees temperature so that frozen foods can be stored for indefinite periods. This compartment is so roomy that enough frozen products can be stored in really adequate quantities.

The full capacity range available is as follows: 8.2 c.ft.; 6.2 c.ft.; 5.3 c.ft., and a table-top model of 4.7 c.ft.

The press-button automatic defroster makes it unnecessary to empty the refrigerator when defrosting. Shelves of the sturdy bar type are on plastic guides heavily plated and lacquered for extra protection. All models are fitted with guide rollers for easy movement.

The door is of the double-trip system with a handle of die-cast brass with block and keys. The cabinet is made of pressed steel sheet finished in special white enamel.

The refrigeration system is designed by the Tecumseh company of Michigan, U.S.A., and the name "Yuman" is derived from an Indian tribe.

Technical Details

Cabinet : Is made of pressed steel sheet of high quality, with door of steel sheet from deep pressing, finished in special durable white enamel.

Freezer : The full-width freezer of high efficiency in special acid-resisting alloy.

Condenser : Fin and tube type condenser, with high heat dispersing quality.

* Managing director is 37-year-old Mr. Derek Clayton who started business life as a plywood merchant one-man business working from a small garage. To-day he has a chain of Do-it-Yourself shops in north-west London and in the "new towns" which include interests in the motor accessories field.

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Compressor: Hermetically Tecumseh type—Licensee Aspera-Turin.

Cold-control: American Ranco.

Cell: Finished in special acid-resisting porcelain.

The prices of the "Yuman" range of refrigerators



The new Yuman "YN" refrigerator.

incorporating the press-button automatic defroster (including purchase tax) are as follows:—

8.2 c.ft. capacity ... £118 8s. 3d.

6.2 " " ... £93 11s. 6d.

5.3 " " ... £82 18s. 7d.

4.7 " " ... Price to be announced.

Two other models of slightly different external styling are available. These models are of 8 c.ft. capacity and 6 c.ft. capacity respectively incorporate the same facilities and are of the same quality. The prices (including purchase tax) with automatic defroster are:—

8 c.ft. capacity ... £108 19s. 0d.

6 " " ... £88 19s. 2d.

The full range is repeated at a lower cost without the press-button automatic defroster.

Among domestic refrigerators and home freezers recently seen in Germany and Austria and not previously mentioned in these columns are the following: the Supert 150, Österreichische Kunststoffwerke Heinrich Schmidberger AG., Wien II, Kleine Stadtgutgasse 9, Austria, which is of 5.3 c.ft. and, by the same firm, the H.S.W. home freezer of 8 c.ft. fitted with warning light

to signal power failure; the Eisfink range of household models from 5.5 c.ft. to 9.4 c.ft. (Carl Fink O.H.G., Asperg/Württ, Germany) and freezer chests of from 7 c.ft. to 9 c.ft.—this firm is a licensee of McCray, U.S.A.; Centaurus deep freezers of from 9 c.ft. to 15 c.ft. (Centaurus Maschinenfabrik G.m.b.H., Bremen).

New Tricity Fridge

A NEW fridge has just been produced by Tricity and retails at the competitive price of 63 gn. Finished in white or ivory epikote hard wearing enamel, the "Four Point Two," as its name indicates, has a capacity of 4.2 c.ft. and the door holds eight pints of milk (or its equivalent), plus an enclosed butter/bacon compartment and a fold-away shelf to hold nine eggs. Tricity Cookers Ltd., it will be recalled, are part of the Thorn Group.

Considerable mobility has been achieved with this refrigerator by the use of four rubber wheels which allow the fridge to be moved freely for wall and floor cleaning. An easily accessible brake lever ensures stability when the fridge is in position. Another important point is that the "Four Point Two" is constructed of rust resistant zinc-coated steel—preventing any possibility of corrosion spread due to accidental abrasion. The top is of vitreous enamel and has a raised edge to prevent spillage of liquid down the sides of the refrigerator.

The freezing compartment has a spring loaded door and also contains a special Tricity feature—a fats tray—tucked neatly out of the way and easily removed without disturbing other stores. Considerable attention has also been given to scientific disposition of the shelves, and the interior finish is of high impact polystyrene. The door fastener is easily adjustable without dismantling, and the door when open does not project beyond the width of the refrigerator—a useful feature when kitchen space is an important consideration. Other features include an interior light, and a salad drawer with combined glass lid and shelf which assist in maintaining the humidity necessary for greenstuffs. The "Four Point Two" uses a



The new Tricity 4.2 c.ft. model.

compressor type unit powered by a 1/10th h.p. motor incorporating start and overload relay. Over-all dimensions are 36 in. high, 21½ in. wide and 25½ in. deep

(including handle), and the styling and finish are designed to be complementary to the new cookers.

Specification

Gross volume ...	...	4.17 c.ft.
Nett volume ...	...	3.90 c.ft.
Evaporator ...	...	0.27 c.ft.
Gross shelf area ...	...	9.15 sq. ft.
Nett shelf area ...	...	8.35 sq. ft.
Evaporator area ...	...	0.80 sq. ft.

Dimensions

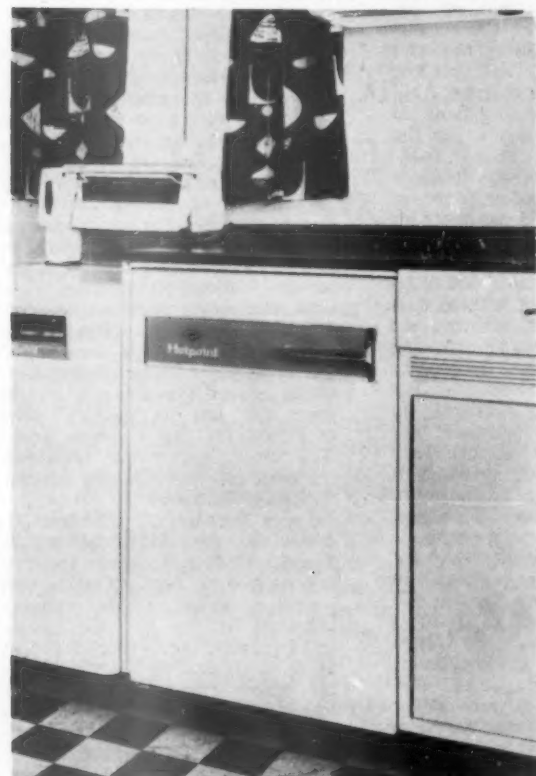
Height 36 in.	Width 21½ in.	Depth inc. handle 25½ in.
Voltage ranges 210/240V.	} 50 cycles only	
Transformer for 185/205V.		
Weight 112 lb.		

Tecumseh Pancake compressor powered by 1/10th h.p. motor incorporating start and overload relay. Hermetically sealed system with Tubonwire condenser, Refrigerant—"Arcton 6," Interior, light—40 watt Atlas lamp, Aluminium ice tray capacity 20 oz.

Hotpoint's New Refrigerators

"ICED DIAMONDS"

"ICED DIAMONDS" are the names of two dazzling new refrigerators in contemporary styling which have just been introduced by A.E.I.-Hotpoint for 1960.



Hotpoint's new E37.

Clean-cut, incorporating the latest design trends, these models are the E37 Super (3.7 c.ft.) Iced Diamond and the E50 Super (5 c.ft.) Iced Diamond.

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Hotpoint's chief, Mr. R. Craig Wood, and Mrs. Craig Wood at the presentation party.

Hotpoint have had well in mind those people who plan their own kitchens and those for whom space is really at a premium. The keynote of the new designs is—adaptability with their clean-cut, squared-off lines.

In the smaller kitchens, the E37 Super Iced Diamond Refrigerator can be installed beneath a work surface or a model is available (with the escutcheon plate and handle in a convenient lowered position) for mounting either on a low cupboard fitting or on a standard 36 in.-high work surface. This is especially convenient in situations where bending has to be avoided. There is provision for adequate ventilation of the unit.

The E37 Super occupies only 21 in. × 21 in. floor space and the E50 Super occupies 24 in. × 24 in. floor space. Both models are available in white or cream stove-enamelled finish on rust-resisting steel with excitingly coloured vitreous enamel table tops—classic white, honey cream, grenadier red, Dresden blue and willow green.

This vitreous enamel table top is standard on the E50 Super but the E37 Super comes with a stove-enamelled top (34½ in. high). If the E37 Super is to be free standing the addition of a vitreous enamel table top is recommended as it provides a non-scratch work-surface and conforms to the B.S.S. height of 36 in.

Prices are the same as for 1959, namely :—

Model E37 Super (3.7 c.ft.)

With stove enamel top (34½ in. high) 60 gn.

With vitreous enamel table top (36 in. high) 63 gn.

Model E50 Super (5 c.ft.)

With vitreous enamel table top (36 in. high) 75 gn.

They are available for 220/250V, 200/210V or 105/115V (single phase 50-cycles a.c. only). Hotpoint Iced Diamond E37 Super refrigerators comply with B.S.S.1691 and Iced Diamond E50 Super refrigerators with B.S.S.922.

They are marketed overseas under the GALA brand name by A.E.I.-Gala Ltd., the export company of A.E.I.-Hotpoint Ltd.

NEW SALES AND STOCK PREMISES FOR DEAN & WOOD

Dean & Wood (London) Ltd., established in 1932, for the sale of refrigeration components to the trade, once again have found it necessary to expand their premises

growth of business, and the demand from the refrigeration trade, for components and controls. In August this year, after many months of searching, accommodation was found, which would be suitable for the stores and trade counter, of a

size required to cope with this expanding demand, and in October 1959 it was possible to move the stores completely, from the premises in Artillery Row, into Gordon House, Greencoat Place, London, S.W.1. The area in Gordon House, now occupied for stores and trade counter, is 4,500 sq. ft., together with complete facilities for vehicles, with a covered loading bay and bank, and electric goods lift direct from the loading bank to the stores. For the trade counter, situated on the first floor of Gordon House, an electric passenger lift is available. With the stores now situated in Gordon House, a total of 8,500 sq. ft. is being used to continue the ever-increasing business. New office accommodation has been arranged in the premises at 17a-19 Artillery



Row, Victoria, S.W.1, in which it is proposed to have a showroom and conference room. This part of the rebuilding programme is expected to be finished by the middle of December, 1959. In September 1945, the agency was taken for the supply of Danfoss refrigeration controls to the United Kingdom. From its small beginning and all the problems involved with import licences, which were at that time required, the demand for these controls has grown larger every year, and to-day in the stores are held large stocks of Danfoss controls. Owing to their excellent design, dependability, and external appearance, plus the wide range of applications, for which there is always a

to keep pace with the growing demand for refrigerator controls and components, to the industry. Originating in premises situated at 5 Dowgate Hill, London, E.C.4, it became necessary in 1945, to take larger premises at 145 Upper Thames Street, London, E.C.4. Again, owing to the growth of the company, it was deemed necessary to move once more in 1953-54 to the present address at 17a-19 Artillery Row, Victoria, London, S.W.1. In these premises an area of 3,500 to 4,000 sq. ft., was occupied for stores and office accommodation. During the years 1957, 1958 and 1959, it became apparent that further expansion would be required owing to the steady

growth of business, and the demand from the refrigeration trade, for components and controls. In August this year, after many months of searching, accommodation was found, which would be suitable for the stores and trade counter, of a

Danfoss control suitable, the sales and demand are expected to carry on growing. One of the more recent agencies is "Anaconda" copper tubing refrigeration quality, and "Anaconda" wrought copper fittings, supplied from Canada, plus the "Anaconda" vibration eliminators, which are all-world tried and proven. This will entail the provision for storage facilities of 15 to 20 tons of copper tubing, to enable us to meet the demand which is growing every day for these products. The sales of PAK-A-GAS, which are the 1 lb., dispensable canisters of Isceon refrigerant, has grown to very large proportions since it was first introduced. Both the larger companies and small service organizations are finding it more suitable for their service departments, as opposed to the older method of dispensing refrigerant from bulk containers into service cylinders. It also ensures that they have at their disposal a perfectly clean and dry refrigerant as and when required.

The "Tilley" lamp agency has meant in actual figures that upwards of 20,000 Tilley lamps have been sold to the refrigeration industry, which is a very good indication as to their reliability and sensitivity, when used for detecting leaks. The overall picture as shown, that to continue as refrigeration component suppliers, the ever-increasing demand must be met by premises and staff capable of attending to the service, which the industry now demands from wholesalers, such as D. & W. The accompanying photographs show in the stores, the spacious packing department, which is now available with ample space for the six packers, now employed for this essential work. The other photograph illustrates the trade counter depicting another "satisfied customer."

From February 22 to March 5, 1960, the first Danfoss/Dean & Wood, United Kingdom training course will be held. During this period a series of six two-day technical lectures and film shows will be carried out. For each period D. & W. are inviting 60 to 70 technical design engineers and service managers from the refrigeration industry. For these periods, accommodation and lecture rooms will be provided at The Shaftesbury Hotel, M. nmouth Street, London, W.C.2, where there will be five members of The Danfoss Mfg., Co., plus the Dean & Wood Staff, for the two-week courses.

Council House Refrigerators.—Dagenham Council's plan to sell its tenants refrigerators on hire-purchase will "put small traders out of business," says Dagenham Chamber of Commerce. It is to hold an emergency meeting to discuss the scheme's effects. The refrigerators would be hired by tenants for between 3s. 5d. and 4s. 7d. a week spread over six years. Mr. Herbert Powell, the Chamber's chairman said: "The instalments are so low that part of the cost of the refrigerators must be borne by the rest of the ratepayers." An electrical trader stated: "It is unfair competition." Alderman Charles Prendergast, housing committee chairman, said: "We even have the power to supply our tenants with furniture. But we don't believe in encouraging them to get into debt. It is different with refrigerators. They are essential in modern homes."

* * *

New Domestic Appliances.—The following return shows the number of new appliances sold by area electricity boards in England and Wales for the month

of September and for the 12 months ended September 30, 1959, together with percentage changes over corresponding periods of the previous year. When assessing the figures it must be borne in mind that the sales by area boards represent only a part of total sales throughout the country.

	Sales in month ended September 30, 1959		Sales in 12 months ended September 30, 1959	
	Total	Percentage change over correspond- ing period of previous year	Total	Percentage change over correspond- ing period of previous year
Cookers	29,776	+ 29.9	336,793	+ 45.9
Water heaters :				
Immersion	17,453	+ 18.8	191,432	+ 21.3
storage	5,148	+ 24.6	58,761	+ 26.8
Wash boilers	6,534	- 11.6	72,131	- 9.5
Washing machines	16,140	+ 95.3	169,427	+ 121.0
Refrigerators	13,688	+ 126.7	164,612	+ 163.6

S.S. "ENDERBY" MOST HEAVILY REFRIGERATED SHIP IN THE WORLD

ON its way through British waters to Antarctica last month was to be seen S.S. *Enderby*, the unit of Hector Whaling Limited's fleet concerned with freezing and storing the whale meat processed in the southern seas.

This vessel contains more refrigeration plant, in terms of B.t.u. extraction, than any other ship in the world.

This refrigeration installation is particularly interesting as in addition to the two original 6½-in. bore × 21 in. stroke Haslam machines, two 6½-in. bore × 21 in. stroke tandem and one 5½-in. bore × 21 in. stroke horizontal duplex J. & E. Hall machines have been added. These additional machines were removed from the S.S. *Bransfield*, also owned by Hector Whaling but now taken out of service. Apart from the usual brine room units for dealing with the cargo spaces, six meat freezing tanks have been arranged on the open upper deck, where the meat is received and fed into ice can type moulds for quick-freezing and wrapping prior to stowage. This has necessitated extra brine pumps, brine heat exchangers and surge tanks, as the brine after its meat freezing duty is used to cool the secondary brine for the cargo spaces.

The following are the essential features and cooling capacities of *Enderby* :—

Gross tonnage 9,494

Net tonnage	5,270
Length overall	480 ft. 6 in.
Length between perpendiculars	460 ft. 0 in.
Breadth moulded	62 ft. 6 in.
Maximum draught	30 ft. 4½ in.
Loaded displacement	19,193 tons
Deadweight	11,193 tons
Draught	9,000 tons D.W.—27 ft. 3 in.
Speed	12 to 13 knots

Refrigeration

Four single and one duplex compressors, approx. 420 tons refrigeration.

Electrical Installation

Two steam turbo and one diesel generator—total 190 kilowatts at 110 volts.

Capacity Refrigerated Provision Room

9,915 c.ft.

Capacity Refrigerated Cargo Spaces

312,254 c.ft.

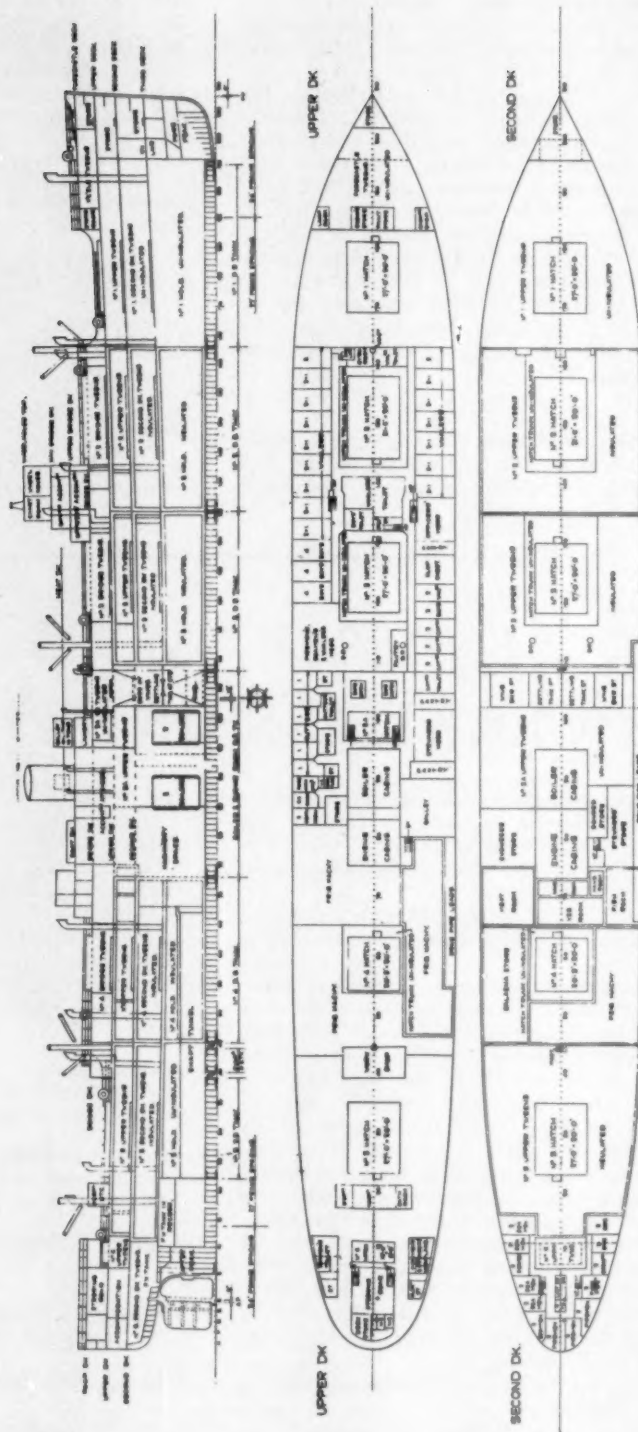
At 52 c.ft. per ton 6,043 tons

Capacity Non-Refrigerated Cargo Spaces

191,892 c.ft.

At 65 c.ft. per ton. 2,952 tons.

S.S. "ENDERBY" — FREEZER AND TRANSPORTER OF WHALEMEAT FROM ANTARCTICA



Courtesy, United Whaling Ltd.

Power Computation by Dimensionless Number

THE 1959 International Congress of Refrigeration in Copenhagen showed a trend back to the indicator card method of computation of power used in compressors for refrigeration. This method became disused with the coming of the enclosed crankcase, with which there are no facilities for mounting an indicator rig for correlating the course of the piston with the movement of the pen.

Papers by Plank, Badylkes and Weinberg dealt respectively with dimensionless numbers, parameters and methods of forecasting power absorption when employing refrigerants for which operating data are not available.

All these principles form the basis of the Oldham dynamometric chart for compressors. This has been evolved as an outcome of repetition of calculating, *ad nauseam*, the gas horsepower of refrigerating compressors on the basis of hypothetical indicator cards, i.e. employing instantaneous pressures inside the compressor as the criteria, instead of tables of thermodynamic properties. It had long been felt that the allowances necessary in the case of tables for the imperfections of a practical machine were too arbitrary, when methods based on the practical indicator card inherently take these into account.

This chart is applicable to compressors for air, gases and dry vapours. Compound compressors are catered for by dealing with each stage separately.

The Oldham number, which is the basis of this simplification of compressor power calculation, was enunciated some years ago by the statement:—

For every ratio of suction and discharge pressures measured inside, and not outside, the compressor cylinder, with the same percentage of clearance, there is a constant factor varying only with the exponential of the law of the compression and re-expansion curves (which depends on the refrigerant or other vapour to be compressed), which when multiplied by the suction pressure gives the power consumed for a given piston displacement either in a practical or in an ideal compressor.

The Copenhagen papers by Plank and Badylkes give the pure mathematician's approach to dimensionless numbers and to parameters. For practical

calculations the parameters have to be brought to more directly useful forms.

The Oldham number is calculated by the following parameter:—

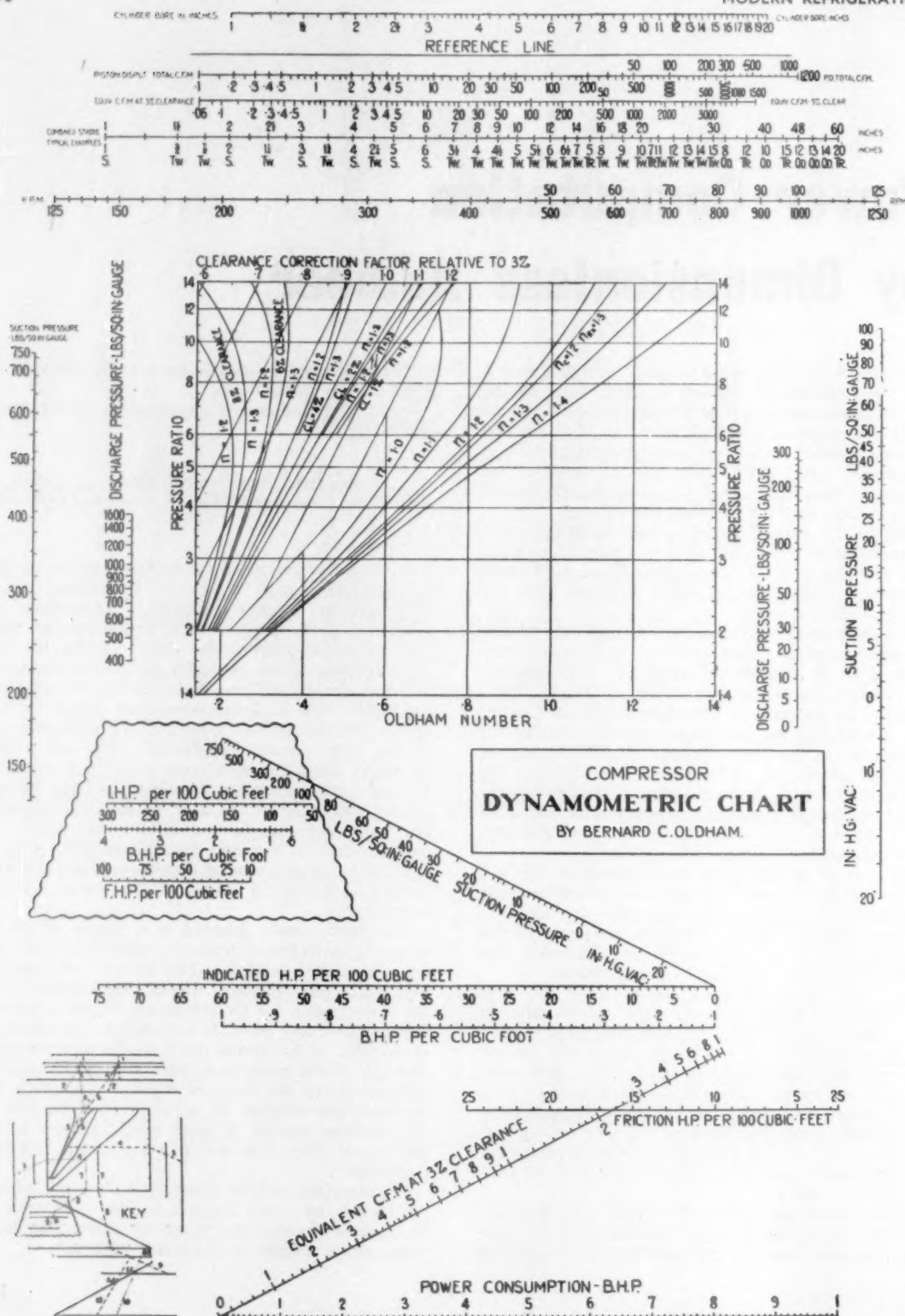
$$O_c = \frac{144 \left[P_s V_s + \frac{1}{n-1} (P_d V_d - P_s V_s) \right] \left\{ 100 \left[V_s \left(\frac{P_d}{P_s} \right)^{\frac{1}{n}} - 1 \right] \right\}}{33000 P_s V_s}$$

and is readily obtained by the centrepiece of the dynamometric chart which is a pressure ratio/dimensionless number diagram. Nomograms at either side of the diagram facilitate the pressure ratio calculation and obviate the simple though troublesome addition factor, normally 14.7, which has to be added to the gauge pressures to convert into absolute pressures. The left-hand nomogram served for the higher pressure air and gases and the righthand one for the more normal refrigerants; they can readily be dually calibrated with corresponding gauge temperatures on the same principle as pressure gauges.

The nomogram at the head of the dynamometric chart provides a graphical method of calculating the swept volume of a piston type compressor. This is supplementary and may be disregarded by those who know or prefer to calculate the swept volume numerically.

The centre main diagram is a family of curves which apply to the adiabatic or polytropic for the gas or refrigerant in question. That marked 1.4 is applicable to the pure adiabatic for air, that marked 1.0 is the isothermal; for the refrigerant or gas employed interpolation may be made according to the adiabatic applicable. A horizontal line from the pressure ratio ordinate to the curve zone, then projected vertically downwards to the base of the diagram gives the dimensionless number, O_c , which when multiplied by the absolute suction pressure gives the gas horsepower per 100 c.f.m. for a 3 per cent. clearance compressor.

The secondary family of curves in the top left-hand portion of the centre diagram enables correction to be made for other clearances by converting total c.f.m. swept volume to equivalent volume.



The scales below the centre diagram are a combination of addition and multiplication nomograms, in order to keep the notation in convenient numbers, the b.h.p. scale is per cubic foot and the last two scales are non-dimensional as on a slide rule, e.g.:—

$$20 \text{ i.h.p. per } 100 \text{ c.ft.} + 5 \text{ f.h.p. per } 100 \text{ c.ft.} \\ = 0.25 \text{ b.h.p. per c.ft.}$$

$$0.25 \text{ b.h.p. per c.ft.} \times 32 \text{ c.f.m.} = 8 \text{ b.h.p.}$$

The scales within the box on the left form a continuation of the corresponding nomogram and are for use with the higher pressures for movements

8 and 9. The final movement 10 may be made on the main chart as indicated on the key at the bottom left-hand corner of the chart. Movements marked 3 and 4 are all that are required to find the dimensionless number; 3, 4, 7 and 8 give the i.h.p. per 100 c.ft. The remaining movements are for the supplementary calculations which can readily be made numerically instead of, or as well as, graphically if preferred.

This chart has also been constructed on the metric system and for multiple-effect and other supercharged compressors.

Advances in Food Preservation

ADDRESSING the Royal Society of Arts, Mr. W. B. Adam, M.A., F.R.I.C., director, The Fruit and Vegetable Canning and Quick-Freezing Research Association, chose as his title for the Armstrong Memorial Lecture, "Recent Advances in Food Preservation."

"The development of quick-freezing in the United Kingdom was interrupted by the Second World War, but is now in full stride," said Mr. Adam. "In its earlier years attention was given chiefly to the freezing of vegetables, the annual production of which in the United Kingdom is now 30,000 to 35,000 tons, and rising rapidly. The industry quick-freezes about 25,000 tons of peas annually, which compares with about 40,000 to 45,000 tons for the longer established canning industry. It takes about 90,000 tons of white fish annually giving a net weight of over 40,000 tons when packaged. Figures are not available for production of frozen meat, poultry and prepared foods in the United Kingdom but these products are rapidly gaining popularity.

"The essential feature of 'quick'-freezing is that the time taken for the temperature of the food to fall from 32° to 25° F.—technically known as the 'zone of maximum crystal formation'—should be short. Rapid passage through this zone results in the formation of small ice crystals, which cause less damage to the structure of the food than the larger crystals formed during slower freezing. There are several ways of freezing foods, but the commonest are blast freezing in air tunnels, and plate freezing. In the former the food is generally passed through the tunnel on trolleys, either in packages or on open trays. In plate freezing the packages are brought into contact with plates through which the refrigerant passes. In both cases the temperature used is generally about -30° F.

"Few fundamental changes have been made recently in the methods of freezing foods, other than for some of the new specialized packs, but great advances have taken place in the presentation of the foods, and a wide range of packaging materials is now in use. Frozen food packages provide a much wider

scope for the designer than does the more conventional can—a feature which is of great importance in this advertising age. The quick-freezing industry has not been slow to take advantage of the changing pattern of domestic life, with the housewife so often away from home on a job during the day, and the evening meal to be served with as little preparation as possible in front of the television set.

"Quick-frozen foods present problems of transport, storage and display which are more complex than those associated with other types of foods, but improvements are continually being made which enable the necessary low temperatures to be maintained until the product is delivered to the consumer. There still appears to be a wide scope for development of frozen foods, provided quality can be maintained, and the present line of advance indicates that the industry is developing its own specialized markets rather than cutting into the existing markets for canned foods. Each type of food has its own particular merits, and the consumer continues to regard both with increasing favour.

Refrigerated Storage and Gas Storage

"Refrigeration is widely used in the transportation of food, such as fruit and meat, across seas and continents, and in the storage of home-grown fruit and imported food before distribution to the retail market. The general requirements to enable this to be done with reasonable success have been known for some time, and recent developments have been chiefly in the direction of obtaining better control of temperature and humidity in stores and ships' holds and in greater efficiency against heat transfer. The building of jacketed stores, the use of new insulating materials to replace cork, and the introduction of new methods of fixing the insulating materials to walls and ceilings are some of the developments which have taken place recently. There have also been changes in the methods of handling fruit both in the orchard and in store. Methods of 'bulk' handling promise to reduce damage and labour costs.

(to be continued)

Commercial and Industrial Section



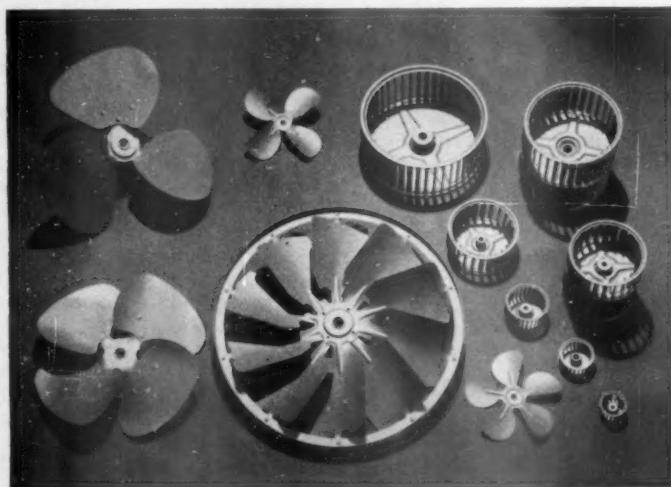
Hotpoint Research Centre.

Another vitally important stage in their expansion programme has just been embarked upon by A.E.I.-Hotpoint Ltd., a leading manufacturer of domestic appliances in Britain. A new research and development centre is to be built on a site adjacent to their Peterborough factory. Work is beginning at once and it is expected that the building will be ready for occupation by next September. The site is large enough to accommodate four additional blocks of similar design and these will be erected to meet future requirements. The two-storey building, with its handsome modern appearance, and vast expanse of windows, will dominate the entrance to the factory. The total floor area is to be 27,000 sq. ft., and the principal accommodation on the ground floor will comprise two large laboratories and a spacious lecture theatre. The drawing office will occupy two-thirds of the second floor with suites of engineering offices adjoining. This large-scale expansion is to provide capacity for increased design and development activities consistent with the growth of Hotpoint's business. When completed, the centre will provide unique facilities for research and development in the whole field of domestic appliances, together with ideal working conditions for their expanding team of engineers and technicians. The architects are Messrs. Walker, Harwood & Cranswick, and the contractors are Sir Robert McAlpine & Sons Ltd. The cost of the first stage will be about a quarter of a million pounds.

MANUFACTURERS' AND DISTRIBUTORS' NEWS

car heaters and allied equipment, has been appointed sales manager of the new department, after a period during which he was engaged on market research in connexion with Smiths' diversifications programme. For some years past there has been an agreement permitting fans of Torrington design to be made by Smiths for inclusion in their own products. The new agreement opens up possibilities of considerable expansion in a fresh field of Smiths activity. "The air impeller department will provide fans for a wide variety of industrial and domestic uses," said Mr. Ward. "These range from air-conditioners, refrigerators and electronic cooling equipment to house-warming units. We can meet almost every requirement calling for air movement. Standard sizes of Smiths Torrington impellers are from 1½ in. to 11 in. diameter for centrifugal types and from 3 in. to 24 in. diameter in axial types." Mr. Ward recently spent two months in America studying all aspects of the Torrington Manufacturing Company's activities.

As a result of an agreement between S. Smith & Sons (England) Ltd. and the Torrington Manufacturing Company of Torrington, Connecticut, U.S.A., a newly-formed department of the Smith organization will manufacture Torrington air impellers and market them throughout the world, with the exception of the Americas. The British company's products will be known as Smiths Torrington air impellers, and will be made and marketed by Smiths' recently established air impeller department, based at the Witney sub-division of Smiths Motor Accessory Division. Mr. J. S. Ward, who joined Smiths six years ago and has been concerned with original equipment contract sales of



Representative examples of Smiths Torrington air impellers, both centrifugal and axial types, now being produced by the recently formed air impeller department at the Witney Sub-Division of Smiths Motor Accessory Division.

The new factory of the Prestcold division of the Pressed Steel Co. Ltd., at Swansea, is to have as production director **Mr. Cecil F. Tracy, M.C. (40)**, who came originally to the Pressed Steel factory at Cowley, Oxford, to take charge of the planning operations for the Swansea factory. Mr. Tracy was born in Berkshire and lives at Woking. He will shortly move to Swansea. The company's official announcement reads: "The Pressed Steel Company Limited announces with pleasure that Mr. Cecil F. Tracy has joined its organization as a divisional director of the Prestcold division with the title of production director of the new Swansea plant. Mr. Tracy served in the Royal Engineers as a regular officer in the late 1930s



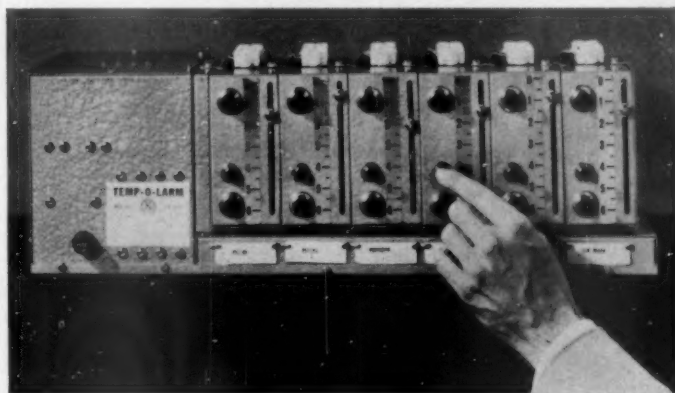
Mr. Cecil F. Tracy.

and during the war had a distinguished career as an assault engineer in combined operations and in the special operations executive, being awarded the Military Cross in the Normandy campaign. After the war, he took an honours degree in Engineering at London University and held appointment with the Ministry of Supply on tank design and later with the Atomic Energy Authority on various planning assignments. He entered the service of Urwick, Orr & Partners Ltd., the management consultants, and came originally to the Pressed Steel plant at Cowley to take charge of the planning operations for the Swansea plant."

The impact now being made on modern industry by the introduction of Rigidex high-density polyethylene is well demonstrated in a new publication issued by **British Resin Products Ltd.** Entitled "Rigidex—the polyethylene plus"—the booklet outlines the increasing use of Rigidex in many different industries and walks of life and shows how the superior properties of this new rigid polyethylene are making more things possible in plastics. The rigidity and excellent corrosion resistance of Rigidex are important in many

COMMERCIAL AND INDUSTRIAL

industrial applications. For example, a range of suction strainers employed in pumping systems for quarries, mines and storage tanks are now moulded in high density polyethylene. These strainers have to be extremely robust, light in weight and rigid, and to be resistant to a wide range of liquids. All these requirements are met by Rigidex.



Designed to detect and give audible or visible warning of temperature changes, the Kidde Temp-O-Larm is intended primarily for use with refrigeration equipment such as frozen-food cabinets and cold stores. It may also, however, be used for sensing high or low temperatures in any type of processing equipment, heating and ventilating plant, etc., where it is possible to site a thermostat. The system takes up very little space, is easily installed, and needs little or no maintenance. Basically, the system consists of a small temperature detector which is placed in each freezing cabinet or vault and connected by wires to an annunciator located where the warning can be most easily heard or seen. Each annunciator unit can be removed or installed very simply by disconnecting the plugs and aligning the couplings. Internal wiring or difficult connexions do not hamper the fitting of these units. A rise in temperature above that at which the device is pre-set sets off the alarm. To compensate for the normal temperature increases which result from defrosting cycles or reloading

a cabinet, there is an adjustable automatic control which can be set to delay the alarm for up to six hours and thus prevent false alarms. Two standard power supply units of 240 volts, 50 cycles, are available to power either 1 to 6 or 7 to 12 separate annunciator units; each of these units can be connected to one refrigerated space. It is also possible for one annunciator unit to be used for more than one refrigerated space provided that the temperatures of the various spaces are within a 10 per cent. relationship of one another and that the defrosting cycle takes place at the same time; thermostats must be wired in series. In addition to detecting temperature changes, the unit can be used to give an indication of loss of refrigerant, faulty thermostats and expansion valves. If a complete power failure occurs, an instant warning is given. The Temp-O-Larm, apart from its uses with refrigeration equipment, also has applications in the hospital field for blood banks and antibiotics, in chemical processes, incubators and greenhouses. Makers are **The Walter Kidde Co. Ltd.**, of Greenford, Middx.

COMMERCIAL & INDUSTRIAL

The chief feature of the Loheat stand at the Dairy Show was a pair of "Neway" rubber doors, with special draught-sealing section, into which was introduced a low voltage heater, making the door especially suitable for low temperature coldroom use. Also included was a cut-away scale model of a typical low voltage frost-heave installation, which aroused considerable interest.



Mr. J. A. Howie, chairman of the British Refrigeration Association and managing director of The Lightfoot Refrigeration Co. Ltd. recently returned from a three-week visit to India. The Indian demand for refrigeration and air-conditioning equipment is very large but the Indian government requires it to be met by local manufacture. Mr. Howie hopes to make arrangements with Indian enterprises whereby the part always played by the British refrigeration industry in India would be maintained.

The secretary of J. & E. Hall Ltd., in a statement last month, said that

this company, which has a paid-up capital of £2,500,000 was recently formed as a subsidiary of Hall-Thermotank Ltd., to take over the business of manufacturers of refrigerating and air-conditioning equipment and lifts and escalators, formerly carried on by that company under the name of J. & E. Hall Ltd. Since the transfer of its business, Hall-Thermotank Ltd. has operated purely as a holding company whilst this company, having adopted the name of J. & E. Hall Ltd., has become the trading company. This transfer, which was undertaken as a matter of internal reorganization only, has not in any way affected the nature of conduct of the business

and the management, staff and workpeople have been retained in their entirety. The transfer of the business became effective on June 22 last and accordingly as from that date this company assumed responsibility for all subsisting contracts and engagements of Hall-Thermotank Ltd. when trading under its old name.

Elliott Brothers (London) Ltd., a member of the Elliott-Automation Group, announces that its branch office in South West England and South Wales has moved to: 55 Westgate Chambers, Newport, Monmouthshire. Telephone: Newport 65710.

OBITUARY

Dr. E. W. Hicks

We much regret to have to record the passing on the 2nd ultimo of Dr. E. W. Hicks of Australia, deputy to Dr. Vickery in the C.S.I.R.O. Division of Food Preservation and Transport. Dr. Vickery writes:

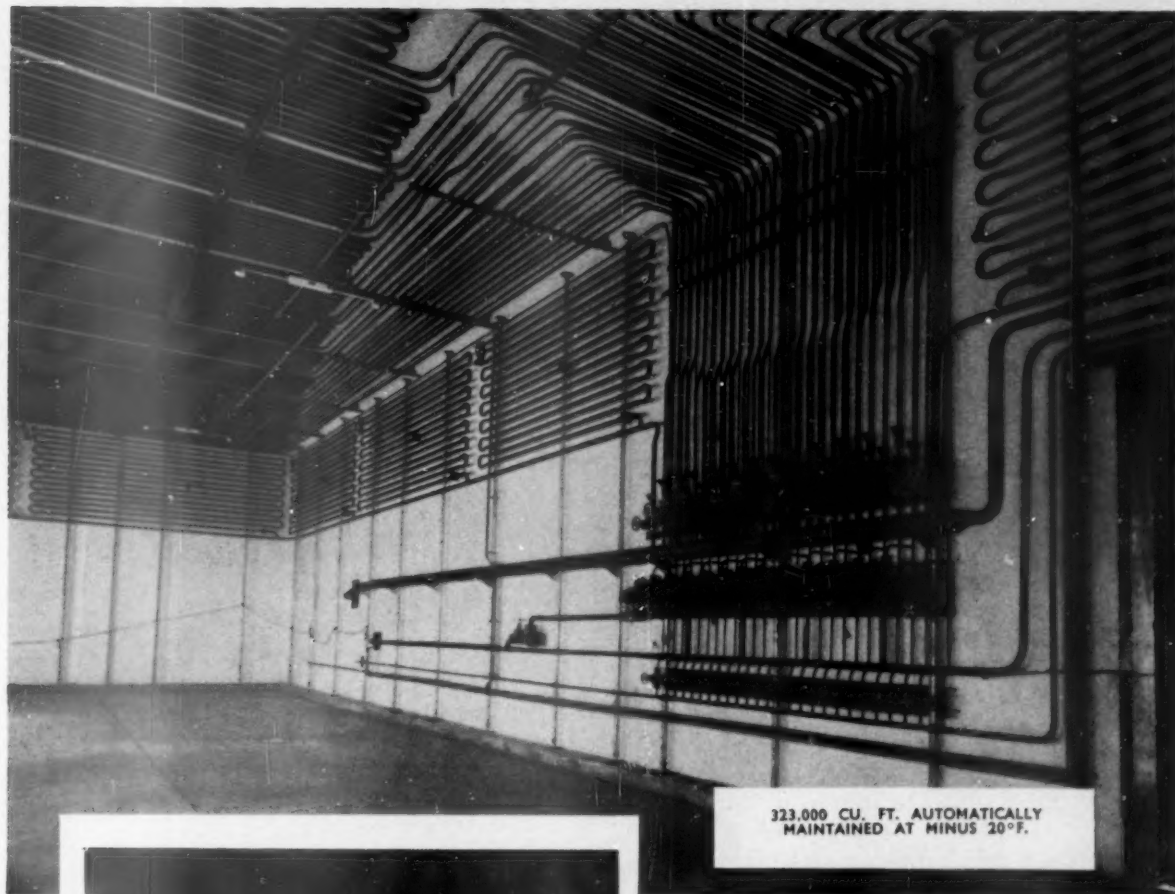
"Hicks's death is a very great loss to this division and to food science in general. It is difficult to assess the extent of his influence on the work of this division where his keenly critical mind and his application of mathematics and physics to food problems were unique. He made a number of major contributions to refrigeration industry and his work supplied a great deal of information for refrigeration engineers to help them in the design and operation of cooling and storage rooms. At the time of his death he was president of the N.S.W. Division of the Australian Institute of Refrigeration and he had recently been appointed a vice-president of commission II of the International Institute of Refrigeration. Hicks leaves

a widow, and a daughter who is now in second year studies in the faculty of science in the University of Sydney."

Mr. A. Southern

It is with deep regret that we have to record that Mr. A. Southern, died after a short illness, on November 12th. Mr. A. Southern was managing director of Southern & Redfern Ltd., Bradford, who are Frigidaire distributors covering the major portion of Yorkshire. He commenced business in Bradford in 1922 as an electrical engineer, and has been actively connected with the refrigeration industry since 1937 when, and up to his death, he occupied the position of managing director. Southern & Redfern Ltd., are also widely known for their industrial electrical installations in which Mr. A. Southern was also very active. Algy Southern was a man greatly respected both for his own personality and his technical and business capabilities. He is survived by his wife and two daughters to whom we extend our sincere sympathy in their great loss.

REFRIGERATION



323,000 CU. FT. AUTOMATICALLY
MAINTAINED AT MINUS 20°F.



The photograph illustrates one of three exceptionally large storage chambers for quick-frozen fish. J. & E. Hall have carried out the pipe work and equipped three of these chambers for Chr. Salvensen & Co., Grimsby, providing a total capacity of 323,000 cu. ft.; the largest measures 116 ft. long x 72 ft. wide x 19 ft 6 in. high. Temperature in the chambers is maintained at -20°F . by two J. & E. Hall compound ammonia compressors. Each unit is powered by a 120 h.p. electric motor, and a third and similar machine is installed as standby. The whole plant is completely automatic in operation.

Refrigerating plant manufactured by J. & E. Hall for the Fish Trade ranges from large installations of this type to small storage cabinets and refrigerated display counters for use in retail shops.

J & E HALL LTD

DARTFORD • KENT

OFFICES AND WORKS THROUGHOUT GREAT BRITAIN AND OVERSEAS



Flooded with orders?

Orders coming in fast? Splendid!

But not if they come in faster than you can handle them. If you can't meet the demand, you may lose that business to your competitors. That's where UDT comes in.

UDT helps you replace old equipment, add new, out of income. Which often means it pays for itself out of increased profits.

A nice business-like way to do business.

If you think UDT could help you, get in touch with the Manager of your nearest UDT office—the address is in your local directory.

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QUICK-COOLING OF MEAT

(Continued from November issue)

By H. G. VANDALL and E. CHRISTIANSEN

In column 2 is a typical arrangement of a cooling tunnel with continuous conveyor and the corresponding after-cooling rooms, etc. In this plant, the twin laminated coolers described are installed.

Ila. Charge System for Pigs

A larger total cooling surface will normally be required for this system than for the tunnel system, as each room must be equipped with a sufficiently large cooling surface for quick-cooling of the warm carcasses.

The same types of coolers as described under Ia are used. If wet coolers are used, a cooling surface of 3 to 6 m² per ton daily intake of meat is required. For laminated coolers a cooling surface of 40 to 60 m² per ton is to be recommended.

As each room is to be used both for quick-cooling and for after-cooling, it is necessary after the quick-cooling to reduce the air quantity and to raise the suction temperature in order to raise the relative humidity. The problems of the charge system are therefore mainly related to the automatic control. By means of this control the following modes of operation can be obtained:

1. Cooling of the room to $-5/-15^{\circ}\text{C}$ before intake of meat.
2. Maintaining a room temperature of $-2/-5^{\circ}\text{C}$ during intake of meat.
3. Quick-cooling at $-2/-5^{\circ}\text{C}$ during 2 to 3 hours after finishing the intake.
4. The cooling is stopped for a short period allowing the room temperature to rise to $+2/+4^{\circ}\text{C}$.
5. After-cooling at a room temperature of $+2/+4^{\circ}\text{C}$.

In the periods 1, 2 and 3, full air circulation and low suction temperature—about -15°C for wet and about -12.5°C for dry coolers—are kept.

Concerning period 2, a quick filling of the room is aimed at, *i.e.* 1 to 2 hours, to obtain a uniform cooling. It will therefore be adequate to make each room for 150 to 300 pigs depending on the slaughtering speed.

The duration of period 3 is controlled by a contact switch (or sometimes by a room thermostat which stops the cooling when the room temperature is sufficiently low). At the end of period 3, the control is taken over automatically by a thermostat adjusted to maintain the desired constant room temperature.

In period 4, it is normal to maintain an air circulation reduced to $\frac{1}{4}$ or $\frac{1}{2}$ capacity, the period being used for defrosting in the case of the dry coolers.

In period 5, the suction temperature is raised to about -10°C for wet coolers, and to about -7.5°C for dry coolers. The fans can be set for half or full

capacity, when the cooling is on, and $\frac{1}{4}$ or $\frac{1}{2}$ capacity when the cooling is stopped depending on the duration of the after-cooling period.

In some cases three different suction temperatures or even stepless, schedule controlled continuous regulation of same, are used.



Typical arrangement of cooling tunnel.

Ib. Tunnel System for Beef Cattle

This system is made fundamentally in the same way as for pigs. However, it is not usual with mechanical transportation through the tunnel. The room temperature in the tunnel is normally not lower than 0 to -1°C . Partly for this reason and partly owing to the relatively smaller surface of the beef cattle—compared to pigs—the passage through the tunnel will take 3 to 4 hours. The air circulation is more moderate than in cooling tunnels for pigs, however, it can be 200 changes per hour.

A room temperature of about $+2^{\circ}\text{C}$ is maintained during the after-cooling, and it takes about 14

to 18 hours to reach a bone temperature of $+5^{\circ}$ or $+6^{\circ}$ C. The air circulation is 20 to 30 changes per hour. When cooling beef cattle there is a tendency to use wet coolers, especially in the after-cooling rooms which are often used for short time storage. By using wet coolers in the after-cooling rooms it is easier to maintain a relative humidity not higher than 80 to 85 per cent. the plant just being operated with a comparatively high brine concentration and correspondingly low suction temperature.

In the after-cooling rooms "combined" cooling is also often used, as in the case of pigs.

In case laminated coolers are used in an after-cooling room, these can be equipped with heating surfaces for drying the air. This is often required in North Europe, especially during the cold season. These heating surfaces can be electrical or possibly formed as condensers for the refrigerant in question. The heating surfaces are usually mounted on the coolers. The humidity is removed by the longer cooling period of the coolers.

The heating surfaces can be controlled automatically by a humidostat which at the same time starts the cooler fans. If the room temperature is thus raised to the desired upper limit, the room thermostat will automatically start the cooling whereby the desired effect is accomplished. If the heating surfaces are made with variable capacities they may alternatively be controlled either by constant operation or they can be put in operation together with the coolers.

Iib. Charge System for Beef Cattle

As for pigs this system requires a larger total cooling surface than the tunnel system, but the types of coolers used are the same. With wet coolers the cooling surface must be reckoned to about 2 to 4 m²

per ton daily intake of meat, while laminated coolers require 20 to 30 m² per ton meat.

Quick-Cooling and After-Cooling.

Even although each room is to be used both for quick-cooling and for after-cooling, there is no great difference between these two periods as for the cooling of pigs, and in several cases, especially in smaller slaughterhouses, no particular difference is made between the two periods, except for the air quantity being reduced.

The following modes of operation can be used :

1. Cooling of the room to 0 to -2° C. before intake of meat.
2. Maintaining a room temperature of 0 to -1° C. during the intake.
3. Quick-cooling at this temperature for 4 to 6 hours after charging.
4. The cooling is stopped for a short period, allowing the room temperature to rise to about $+2^{\circ}$ C.
5. After-cooling at about $+2^{\circ}$ C. room temperature.

The control is fundamentally as described for pigs under IIa.

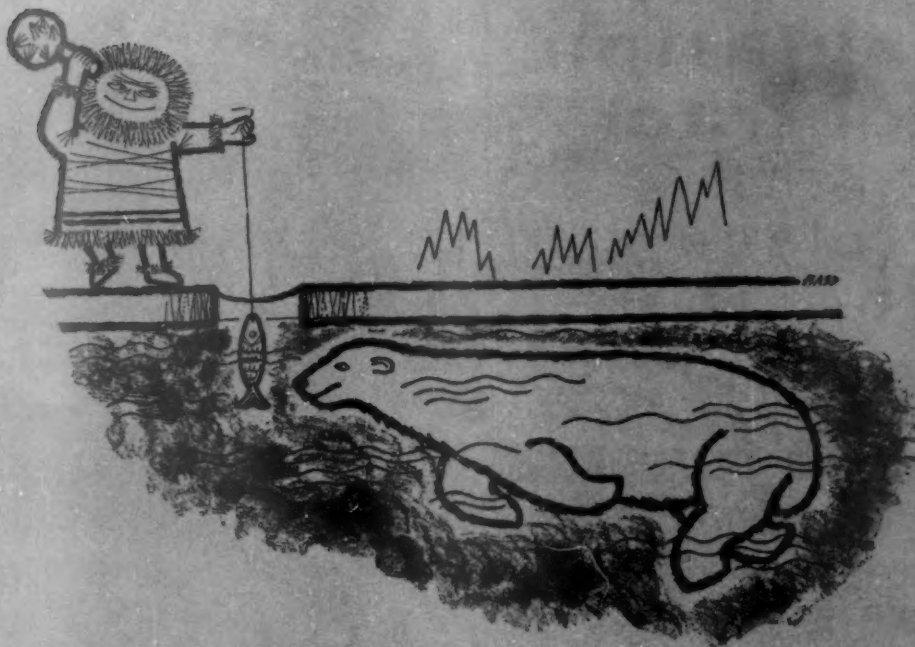
In the after-cooling period and especially when the rooms are being used for storage, the previously described regulation of the humidity by heating surface may be required.

The automatic control systems described require an extensive electric installation which should be executed with due consideration to the possibility of variation in the modes of operation during varying loads.

The systems described above are based on a number of experiments made in Danish slaughterhouses.



Increasingly the Eskimos of Alaska, Arctic Canada and Greenland are adopting the "white man's way of life," as is stated on page 1057 of this issue. Brought into contact with vacuum cleaners, electricity, sewing machines, refrigerators and all the other items of the 20th century to be seen in the new mining and oilfield, military and administrative centres in the Arctic, and earning good wages on the construction sites, one-time polar bear hunters are buying all manner of commercial and household appliances.



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The Institute of Refrigeration Bulletin

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JANUARY MEETING

AT the meeting of the Institute to be held on Thursday, January 8, 1960, at 5.30 p.m. at the Institute of Marine Engineers, The Memorial Building, 76 Mark Lane, London, E.C.3, Mr. H. Heckmatt, B.Sc., associate member, will present a paper entitled "Some lubricating problems of refrigerating machines using Refrigerant-12."

The following is a summary of Mr. Heckmatt's paper:—

Work done on experimental refrigerators using Refrigerant-12 showed that bad performance in the cold side was usually preceded by the creation of an extremely "cold spot" at the expansion point. In the light of this finding the mechanism of malfunctioning due to extraneous matters such as moisture, corrosion products or deposits from the lubricating oil was studied. Subsequent examination of defective expansion valves and capillary tube restrictors from field units confirmed the experimental results.

It was found that certain modifications to expansion valve design, and the use of a pressure (instead of thermostatic) control switch, reduced the tendency towards the initial "cold spot" conditions.

ANNUAL DINNER

The diamond jubilee dinner of the Institute will be held at the Savoy Hotel, London, W.C.2, on Wednesday, January 27, 1960, at 7 for 7.30 p.m.

The president, Sir Rupert De la Bère, Bart., K.C.V.O., will be in the chair and the guest of honour will be the Right Hon. the Viscount Simon, C.M.G., chairman of the Port of London Authority.

Full details and forms of application on which to apply for tickets have already been forwarded to all members.

ENGINEERING EDUCATION IN LONDON AND HOME COUNTIES

A useful and interesting booklet entitled "Engineering Education in the Region" has recently been published by the Regional Advisory Council for Technological Education: London and Home Counties.

The booklet should be of interest to persons concerned with the training of engineers, or with

advising school-leavers in their choice of further education.

It has been produced with the aim of assisting young men and women in London and the Home Counties who wish to follow a recognised course in some branch of engineering. The courses listed are those which the colleges propose to offer during the academic session 1959-60: each course will start only if an adequate number of students enrol.

A quick glance through the booklet will indicate the wide variety of courses available in each branch of engineering, and intending students are recommended to seek competent advice to enable them to choose the types of courses that will be most appropriate for them. Such advice can be obtained from careers masters at schools, youth employment officers, company education and training officers, the principals of technical colleges, and from the professional engineering institutions. The choice of a course will depend upon a student's academic ability and the type of work he or she hopes to do or is doing.

Copies of the booklet may be obtained from the secretary, Regional Advisory Council for Technological Education: London and Home Counties, Tavistock House South, Tavistock Square, London, W.C.1, price 3s. 6d. per copy post free.

Congress Symposium

THE 1959-60 session of The Institute of Refrigeration opened on October 22 with a symposium on "The Tenth International Congress of Refrigeration."

Dealing with "Some engineering topics," Mr. W. B. Gosney, B.Sc., member, said, in part: "In commission 3, several papers dealt with the indicating of small reciprocating compressors. One of these by Fünér, Schöbel, Tauchmann and Bach, described a method of indicating hermetically sealed compressors by using a quartz crystal as the pressure pick-up. Another method of indicating compressors, in this case of somewhat larger size, was described by Lorentzen and Johansen. They employed a capacitor pick-up formed by a flexible steel membrane a few tenths of a mm. in thickness against a flat, rigid electrode. A different approach to the study of compressors was explained in a very interesting paper by Pearson. He used a constant temperature hot wire anemometer installed in the suction port to determine the instantaneous velocity of the gas, and thus estimate the suction blow-back.

"Volumetric efficiency of compressors was also discussed by Bendixen, who reported results obtained with uniflow and return flow compressors, which were otherwise identical in clearance and valve sizes, etc. He found that there is no significant difference between the volumetric efficiencies of the two types, and he therefore discounted the theory, still current in some text-books, that uniflow compressors are better because

there is less opportunity for the suction vapour to pick up heat by flowing over parts of the cylinder and head previously heated by the discharge gas.

"The difficulty of obtaining the speed of a sealed compressor on test is well known, and an interesting device to measure this was described by Murdoch and Hurrell. The principle is that of picking up pulses in the discharge tube by means of a small throat microphone clipped to the outside of the pipe, and measuring the difference between their frequency and a standard reference frequency, which may be mains frequency so giving the slip speed of the motor.

"Irregularities in the behaviour of thermostatic expansion valves are a perennial topic for discussion, and the paper by Heckmatt furnishes some more fuel for the flames. Contrary to the usual belief that Refrigerant-12 and oil are so readily miscible that a strong oil component cannot exist anywhere in the expansion side of a refrigeration plant, the author found that this is not so in the expansion valve, at least those of certain design, and that it can interfere with the valve operation.

"A great deal of interest was shown in the papers on thermoelectric refrigeration. A communication from Academician Ioffe, read by Professor Martynovsky, summarized its present state of development. The maximum cooling effect now obtainable is 75° C. with a high temperature of 27° C, which would give a c.o.p. of unity at a temperature difference of 30° C. It is understood that units up to a few hundred kcal./hr. are being produced in the U.S.S.R.

"A number of papers were presented to commission 2 which were of considerable interest. A paper by Powell and Challoner, reporting values of thermal conductivity for halo-hydrocarbon refrigerants, makes it appear almost certain that the values of Markwood and Benning which are given in most of the data books are much too high. Heat transfer to Refrigerant-12 was dealt with by Worsde-Schmidt, who presented results showing the effect of oil in evaporators. Contrary to popular belief, except for very long evaporators, the presence of oil increases the heat transfer coefficient."

On "Applications to foodstuffs," Dr. J. C. Fidler, O.B.E., B.Sc., member, stated "that most of the papers on this topic were presented during the meetings of the fourth commission, where this is the principal field of work. But other commissions, notably the fifth, seventh and eighth had many papers on storage, processing or handling of foodstuffs.

"Of the many papers on meat, one of the most interesting was that by Lorentzen and Rosvik (Norway) on direct freezing of carcasses immediately after slaughter. This system must be worthwhile, if only for the saving in time during freezing. Weight loss is reduced, but it was said in the discussion that this saving is not maintained during subsequent storage.

"Experience of storage of frozen meat in the fully jacketed cold store No. 12 in Moscow was described by Rutov and Alekseyev. This paper is worth reading fully, because of the useful information on the need to insulate the divisions within the jacket, and the maximum temperature tolerance between jacket and store.

"All assessment of 'storage life' depends on assessment of 'quality.' There were several papers on this. Noskova and Peck (U.S.S.R.) propose to use the psychrophilic bacterial count as an index for frozen foods. Barnes (U.K.) investigated the bacterial flora of eviscerated poultry, and found (a) that most of the infection was from the feet and feathers, and not the gut, and (b) the danger points in the plant are the slush ice tank and the water supply. Kitchell and Ingram (U.K.) could find no experimental evidence to support the old mistaken idea that frozen goods spoil more rapidly on thawing than do fresh.

"The papers on fish were very disappointing. No new processes were described and much of the work had previously been reported.

"There were papers dealing with thawing of bulk blocks of frozen fish, and on assessment of quality of fish.

"Only one paper was presented on dairy produce, by Wearmouth (U.K.). Oddly enough, this was one of the few papers which fitted my idea of the type most useful for a congress; it gave a broad survey of modern trends. To my mind, the detailed scientific discussion of some narrow facet of a particular problem is best discussed at commission meetings, between congresses.

"Papers on fruit included several from the U.K. Tomkins described a simple, small-scale gas-storage system for testing the reaction of new varieties, Smith gave a summary of his work on transport of raspberries in high concentrations of carbon dioxide and on storage of blackcurrants at 34° to 40° F. in atmospheres enriched with CO₂, and Fidler reviewed methods of controlling superficial scald, a serious physiological disease of apples.

"Smock (U.S.A.) outlined problems they had encountered in gas storage (or C.A. as they call it), with particular reference to a water scrubber which saves caustic solution (but may be heavy on power).

"Lentz and Phillips (Canada) talked about jacketed stores for fruit and vegetables. This paper produced such a lively discussion that several interested people got together in the evening to continue the argument. Indeed, this happened on several topics, and small impromptu meetings were going on all the time.

"Mainly in commission 5, there was much on quick-freezing of fruits and vegetables. Another good 'congress' type of paper was that by Meadows (U.K.).

"Much interest was shown in a session devoted to freeze-drying of foodstuffs, with papers from East Germany, U.S.A. and the U.S.S.R. This process is costly and unlikely to be used except for what an East German young lady called 'non-normal catastrophies.' Nobody nowadays seems to think radiation technology is likely to replace refrigeration, and discussions of the value of radiation (and also of antibiotics) as an adjunct of refrigeration, tended to be carried out in a calmer atmosphere. Certainly everyone found the papers from the *Entrepôts Frigorifiques Lyonnais* extremely interesting, and not a few commented on the useful work being done by this commercial cold-storage firm.

"Pre-packs are here to stay; so is refrigeration as an aid to distribution and sale. Thus the nature of the wrapping materials, and their mode of action on the produce, is a pertinent topic. Interesting papers were those by Marcellin (France) and Heiss (Germany).

"Mr. Hales's paper describes work in the transport sessions, relevant to foodstuffs; all I wish to say here is that much of the discussion was calculated to shake a biologist's belief (already somewhat shaken) on the ability of the engineer to move air to where it is needed! Much ductwork seems largely ornamental.

"Professor Plank produced a mathematical formula for effect of temperature on storage life. This was attacked from two sides, by Moreno Calvo (Spain), because it was not sufficiently involved, and by Tomkins (U.K.) who underlined the dangers of a purely physical approach to a fundamentally biological problem.

"Although not part of the proceedings of the congress, there was much interest in the recent publication of the fourth commission on 'Recommended conditions for the cold storage of perishable foodstuffs'."

The subject of "Transport" was handled by Mr. K. C. Hales, M.A., member, who declared that "consideration of the problems of refrigerated transport is the responsibility of two commissions—7 which deals with transport by land and air and 8 which deals with transport by sea. At the recent congress one of the plenary sessions was devoted to the subject of transport as a whole. The purpose of a plenary session is to review a subject for the benefit of those who are not specialists in it. On the whole the session on transport fulfilled its purpose admirably and the papers by Pieffort and Christiansen and perhaps more particularly the latter can be recommended for reading.

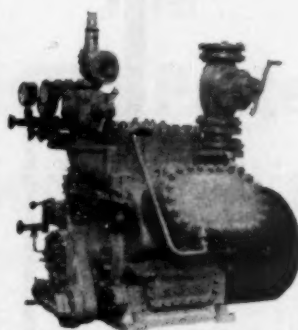
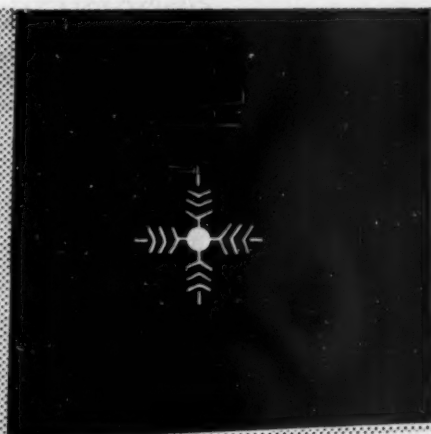
"There is a good deal of common interest between the two commissions and of course commission 2.

"A review of the present position in U.S.A. was given by Elfving. The number of refrigerated vans in service is increasing with the preferred system at present being compressor refrigeration with a diesel electric power unit.

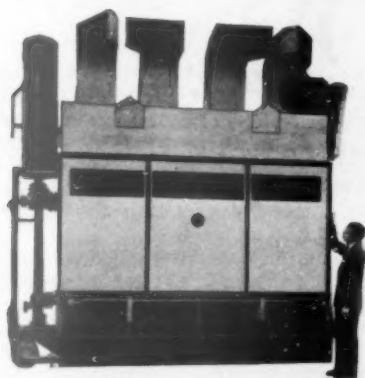
"A number of papers dealt with ice or eutectic cooling of vans. Two papers dealt with refrigerated containers, one of which prophesied their increasing use in combined rail, road and ocean carriage.



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SHOP REFRIGERATION NEWS



The Changing Pattern of Food Retailing

By OUR RETAIL CORRESPONDENT

IS that long line of cabinets at the top of this page becoming misleading as a symbol of the characteristic trends in retail refrigeration practice? "M.R." has for some time been using it as a title picture for these reviews of shop installations, and a few days before writing this present monthly survey, I would not have questioned its appropriateness for permanent use.

Now comes a shadow of doubt. But it is a very faint shadow.

In a recent talk on quick-frozen food to members of the Self Service Readers' Club, an executive of a large multiple company threw out a challenge to the efficacy of this type of layout. "A long line of refrigeration looks impressive," he said, "but is it effective?"

He went on to explain that in America cabinets are often split up into their respective commodities, quick-frozen vegetables in the vegetable department and quick-frozen meat in the meat department. The inference to be drawn from this is, of course, that more self-service stores in this country should do the same.

There are, however, many good reasons for having a number of refrigerated display cabinets in one long line. Several of the leading makers produce standard types of cabinets so constructed that they

can be joined up in a continuous line. This makes for economy in space, and sometimes saves time and cost in installation.

In supermarkets it is an almost standard practice to have a long run of cabinets for meat running parallel with the back wall of the store, and the run often includes a cabinet for poultry, and another for cooked foods. Dairy goods or provisions are often linked, and, in many shops, I have seen frozen food cabinets cheek-by-jowl with refrigerated displays of salads, fresh fish, or cooked-foods and delicatessen.

Woolworth's have a long, but broken, line of cabinets down one side of many of their branches, self-service or otherwise, and so do many of the food sections of the department stores, self-service or otherwise.

Now it is quite apparent that there is more in this linking up of cabinets than economy and convenience in layout. If it had not proved good merchandising practice, it would long ago have been scrapped and, regardless of greater cost and trouble, the cabinets would have been "broken up" and sited more or less haphazardly about the shop.

I have watched shoppers passing slowly along the front of a run of refrigerated cabinets, picking up an item here and another there. Sometimes after a glance at a pack it is put back; but seldom do they

SHOP REFRIGERATION

pass along without adding something from the refrigerated display to the contents of their baskets. Judging from my own observations in large self-service stores and supermarkets, it is easier and more pleasant for a woman to pick and choose from one level. Her eye takes in more at a glance, and there is a smooth rhythm in her purchasing progress.

If her attention is distracted by a sudden break in her line of vision, that break may prove to be a diverting influence, causing her to discontinue her systematic purchasing and dart across to another part of the shop.

In support of this contention I have the evidence of more results of observation. In self-service

stores where runs of wall-shelving are broken by the insertion of a single refrigerated cabinet, this generally means that the cabinets, being deeper from front to back than the shelves, project 12 or 18 inches farther forward.

I have watched from a point of vantage the effect of this check on the movements of the customers passing slowly along the front of the ordinary shelf fittings, helping themselves from various positions. The effect of the projecting cabinet, because it caused them to make a short step backwards, was to become a physical check on their progress.

The tendency was for them to veer away from it : to move over to a centrally placed gondola. Some customers stepped quickly to the next set of shelves, others paused to study the contents of the cabinet



A view of the Premier Supermarket, Harrow, Middlesex, which was opened to the public on November 17. In the foreground can be seen a 48 ft. run of Frigidaire Manhattan refrigerated display for the display and storage of fresh meat. Altogether, 157 ft. of refrigerated display has been supplied by Frigidaire for the new store.

A run of refrigerated cabinets in one of the London Co-operative Company's food halls.





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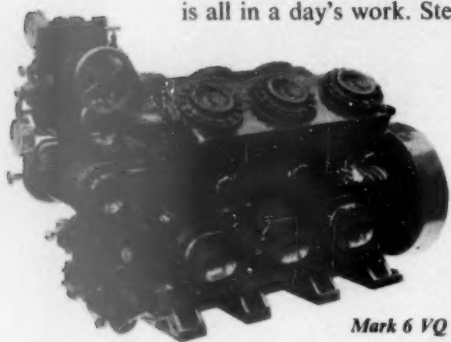
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and may be to help themselves to one or two items. A majority ignored or merely glanced at the cabinet, and moved on in a different direction.

It was particularly noticeable, however, that, where the cabinet was sufficiently recessed into the space between two sets of wall-shelving to obviate or minimize any projection, and to permit of the introduction of a bridge of shelves at eye-level and just



A run of Marco refrigerated cabinets in a Woolworth store.

below, it did not become an interruption. A good proportion of customers helped themselves from the shelves above the cabinet, which linked the shelf units on either side, and then looked down into the cabinet, studying its contents and occasionally picking up a pack and putting it in the wire basket provided by the store.

I am aware that there are self-service organizations who prefer to have a number of refrigerated cabinets individually isolated from the main run of refrigerated display, on the grounds that they encourage impulse purchasing. But, for two reasons, I consider that argument to be unsound :—

- (1) Because the foods suited to refrigerated display do not lend themselves to the dump methods used to induce women to buy on the impulse.
- (2) If this principle of impulse selling is carried to its logical conclusion, the cabinet must not remain static. Its position must be changed every week, so that the customer comes across it suddenly in the most unexpected places. As that is obviously impracticable, since it involves the re-arrangement of other fittings as well, it is far better to limit this principle of selling to goods that can be dumped in bins or racks in independent positions.

SHOP REFRIGERATION

The most practical alternative to or auxiliary of the straight run of refrigerated display is the island group with cabinets back to back. This offers the same advantages as the gondola, in that it affords facilities for displays that can be approached from all angles.

Summing up, we can, I suggest, accept the broad principles that :—

- (1) The long line of refrigerated cabinets for meat and allied products is correctly located at the back of the store because :—
 - (a) It draws customers through the whole depth of the store, thus ensuring that they see the maximum amount of stock and are tempted to buy more on their way in or out.
 - (b) The cutting up of the meat, the preparing of cooked products, and the packaging of both can be carried on immediately behind the position in which they are displayed for sale, thus saving time and minimizing handling.
- (2) The grouping of other refrigerated displays, in islands of two or four cabinets, according to the size of the interior, is preferable to having them in isolated sites.

Lieutenant-Colonel J. D. S. Young, D.S.O., M.C., who joined Marco Refrigerators Limited on January 1, 1954 as contracts manager, has resigned his appointment as general sales manager of the company with effect from November 23, 1959.

SHOP REFRIGERATION

New Smithfrige- McCray Display Cases



THE modern method of self-service selling has become an established part of our way of life. In America the development of this idea has been even more rapid and the need for better refrigerated self-service cases has led to tremendous technical advances in this field. The McCray Company of Kendallville, Indiana, has for a long time been in the forefront of this spectacular advance with a range of cases to meet every exacting requirement of the progressive self-service store. Smithfield Refrigerator Co. Ltd. of London are now manufacturing these cases under licence in this country. The McCray range includes cases for selling meat, dairy produce, frozen food and ice cream. They are available in 8 ft. lengths with detachable ends to permit single or continuous installation. Colour and finish can be chosen to match the decorative scheme of the shop.

All cases are cooled by "Koldflo" forced air circulation; frost is collected on the cooling coil in the base and is thawed and removed entirely automatically.

The following are the various models, showing display area, sq. ft., and display volume, c.ft., in parentheses:—

- M—8a, meat, wall type (22.26, 29.8)
- DAS—8a, dairy, three tier (36.0, 40.9)
- FF—8b, frozen food, wall (19.66, 25.0)
- IC—8b, ice cream, wall (19.66, 25.0)
- IDFF—8c, frozen food, island (19.66, 21.29)
- IDIC—8c, ice cream, island (19.66, 20.47).

Gas Air-Conditioning.—Akron's (U.S.A.) luxurious Carlton House will mark the largest use of individual gas air-conditioning units in a single apartment house. Summer cooling and winter heating will be provided for the suites by 58 three-and-a-half and five ton Arkla-Servel Sun Valley gas air-conditioners. The designer insisted that each apartment have individual thermostat control as well as individual installations to eliminate the need for large compressors and any possible vibration. Because gas is also used for cooking as well as heating and cooling, there was no need for installing heavy cable. The Arkla units will be installed in the utility rooms of each suite. Four small water towers, located on the roof, will provide condensing water for the system. The water will be constantly recirculated, thus keeping its cost at a minimum.

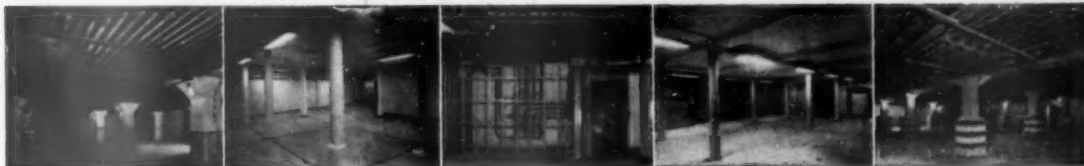
A NEW DUAL-PURPOSE FROZEN-FOOD CABINET

Lec Refrigeration Ltd., of Bognor Regis, have brought to their already extensive range a new dual-purpose frozen-food cabinet. This model, C.D.35, has been specifically designed to meet the needs of those who desire to display their goods and still retain the freshness of refrigera-

ted storage. The illuminated display section which has a capacity of 5.2 c.ft., has three fully adjustable shelves with full vision illumination which enable retailers to show the maximum volume of goods in the minimum of space. The conservator

storage space has a capacity of 2.8 c.ft. The all-steel cabinet of the C.D.35 embodies many advances and new features. With external dimensions of height 41½ in., width 54 in. and depth 21½ in., it is a very convenient "forefront" display cabinet.

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THE *new* KELVINATORS

Styled in America—
made in Britain for you!

Kelvinator, world pioneers of refrigeration, present a brilliant new range of models, combining the quality of British engineering with the styling and performance born of more than 45 years experience. Be sure to see these handsome refrigerators at your electrical showrooms or dealers. You'll love the crisp, clean design, and marvel at the amount of storage space within cabinets of such obligingly small dimensions. There are models from 4.6 to 9.4 cu. ft.

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You get more food into it—more fun out of it!

This 8 cu. ft. Kelvinator (model 17) is 17 in. high and 24 in. wide. It is the only one of its kind in the world. It is the only one of its kind in the world. It is the only one of its kind in the world.

■ **SPACE SAVING.** The large capacity Kelvinator takes up no more floor space than for smaller refrigerators of other makes. The doors of all models open within the width of the cabinet—your Kelvinator may be installed flush against other kitchen equipment.

■ **ECONOMY.** The extraordinary built-in refrigeration and costs about a penny a day to run and is guaranteed for five years. Over 15,000,000 units have been supplied throughout the world.

■ **VALUE.** Compare the price per cubic foot capacity of a Kelvinator with any other make, and see how much more space you get for your money. Adjustable shelves, an extra model, give flexibility of storage.

■ **FREEZER CHEST.** All Kelvinators above 4.6 cu. ft. have an extra-low temperature Freezer Chest, for long term storage of frozen food, and for freezing garden produce.

POST THIS COUPON NOW

Please send me literature describing all Kelvinator models and showing what to expect from these space-saving, small refrigerators in my kitchen. Also send me the names of my nearest dealer or dealer.

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Address (Print Name) _____

Send this to: KELVINATOR LIMITED, GREAT WEST ROAD, LONDON, W.4.

Miniature replica of whole page advertisement

KELVINATOR LIMITED, GREAT WEST ROAD, LONDON, W.4.

CVS-13

U.S. REFRIGERATION ON SHOW

at Atlantic City

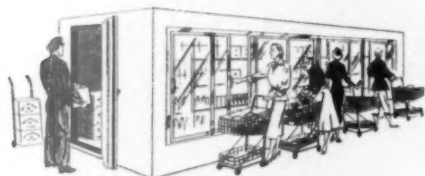


Of the many major national exhibitions and conventions taking place in the United States during the fall, those of the refrigeration industry (ARI, Atlantic City) of the frozen foods distributors (NFFDA, Chicago) of the baking industry (ABA, Chicago) and the rubber industry (IRC, Washington) were of direct interest to Maclaren & Sons Ltd., parent company of Refrigeration Press Limited and other subsidiaries. "Modern Refrigeration and Air Control," "Frozen Foods," "The British Baker" and "Rubber Journal and International Plastics," are four of Maclaren's journals covering the above fields, and the managing director of the parent company, Mr. John D. Copeman, has lately returned from a four weeks' visit to the United States during which time he attended the above conventions. The 11th Exposition of the Air-Conditioning and Refrigeration Industry is reported upon hereunder.

THE 11th exposition of the Air-Conditioning and Refrigeration Industry was held last month in Atlantic City, New Jersey. For the first time, a special conference session was included by the Air-Conditioning and Refrigeration Institute, whose managing director is Mr. G. S. Jones, jr.

Since the number of exhibitors totalled approximately 200, it is not possible to include here a stand-by-stand account of the exhibition. Instead, we select some commercial items new to most readers, we would imagine.

The increasingly essential role air-conditioning and refrigeration play in today's age of atomic submarines, supersonic aircraft, missiles and complex weapons systems was dramatically portrayed in the

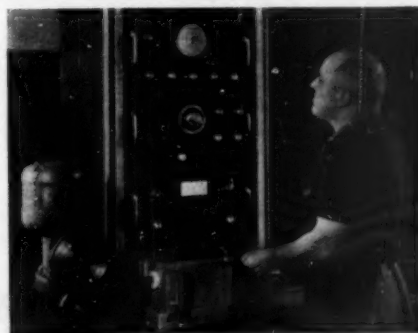


New type of frozen-food merchandiser of walk-in design. Shop customers take food from behind sliding glass doors.

huge convention hall. The U.S. Department of Defence displayed for the first time unique exhibits of the Army, Navy, Air Force and Marine Corps. A substantial part of the Navy display was devoted to sub-surface uses of refrigeration, notably by the growing fleet of atomic subs, one of which has already been submerged for a period of 60 days. The exhibit included a model of the new nuclear submarine

"George Washington," which, like her sister-ships, is not dependent on the earth's atmosphere for its operation.

Something novel in frozen-food merchandising is the Barrdor, made by the Barr Manufacturing Co. of Oakland, California. As the illustration shows, this built-in frozen food display comprises a long refrig-



This machine tests copper refrigeration and restrictor tubing manufactured by The American Brass Company at its Waterbury, Conn. plant. It is based on the principle that when a tube is passed through a properly adjusted electric field, microscopic flaws in the surface or metal structure of a tube, through their disturbing effect on the induced eddy currents, are indicated.

erated walk-in type of chamber with sliding glass doors for easy access to the produce. Stocking of the freezer shelves takes place from either end.

Du Pont's "Freon" products division exhibit at the exposition provided a "capsule review" of man's

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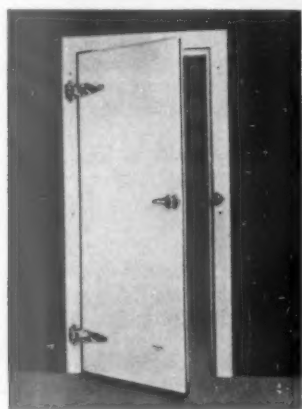
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db26

efforts to keep himself and his environment free from oppressive heat. Six shadow box displays were used to trace cooling developments through the ages, from primitive evaporative cooling devices to the most modern automatically controlled refrigeration systems. Periodically during the four-day



The new lightweight "Jamolite" flush-fitting cold storage door reduces refrigeration losses, minimizes worker fatigue and cuts clean-up time. The door has been developed by the Jamison Cold Storage Door Company.

meeting live demonstrations on a miniature stage featured the safety and cooling characteristics of "Freon" refrigerants.

Viking Air Products of Cleveland, Ohio, showed a jet room balancer which provides an increased air flow to overcome the resistance of undersized ducts



Ice flaker seen at Atlantic City.

or long runs. One size fits all ducts; it makes no difference whether the duct is 4-in. round or rectangular up to 8 in. \times 8 in.

Two different types of foamed plastic insulation materials that have simplified installation techniques in addition to providing improved thermal efficiency were displayed by the Armstrong Cork Company.



The Ebco Manufacturing Company's pressure-type Hot 'N Cold complete with refrigerated compartment and two ice cube trays. It also serves hot beverages.

The two products were Armstrong Armaflex, a flexible foamed plastic pipe and tank insulation in both tubular and sheet form, and Armalite, a rigid foamed plastic insulation board for low temperature insulation. Armaflex, which is both flexible and resilient, has a built-in vapour barrier finish. Nominal $\frac{3}{4}$ in.



Domestic size ice maker.

Armaflex stops condensation at temperatures down to zero. Armaflex may be used on lines operating up to 200°. Its low thermal conductivity of 0.28 at 75° F. mean temperature allows the use of minimum wall thicknesses on cold as well as heated lines.

At the Dow Chemical Company's booth, a chemicals team demonstrated the Dowtherm SR-1 system (for snow removal on sidewalks, runways and platforms). The chemists made their own snow and removed it on a table top model. A plastics team demonstrated the utility of Styrofoam, Dow's expanded polystyrene, as an effective low temperature insulant. With thermocouples and dry ice, plastics engineers showed temperature extremes inside and outside a one-inch insulation layer of Styrofoam. Another display—goldfish in a box fashioned of Styrofoam—demonstrated that the material is both waterproof and non-toxic.

The postwar development of lightweight cold storage doors has been prompted by the increased employment of women by stores and industries in refrigerated operations, the increased popularity of frozen foods, and the advances in plastic materials. The new "Jamolite" door developed by Jamison Cold Storage Door Co., Hagerstown, Maryland and shown in Atlantic City, is much easier to open or close than wood or metal-clad doors and will minimize fatigue of employees working in and out of cold storage areas. It also costs less than previous freezer doors of comparable insulating efficiency. All exposed surfaces on the door and frame—front, back and edges—are composed of glass reinforced polyester resin. Insulation is foamed-in-place polyurethane plastic that has excellent thermal insulation properties (K factor in the range of 0.15 at 70°F), great strength with light weight, good acoustical properties and excellent adhesion to polyester plastic, wood and metal.

"Scotsman," Queen Products Div., introduced new models DC-3 super cuber and model DF-4 super flaker ice machines. These two units have been designed as built-ins to meet the demand of those who desire a small daily capacity. The new model DC-3 super cuber will make up to 50 lb., or 1,200 cubes daily. Unusually compact, the new unit only occupies 3 sq. ft. of floor space. A heavily insulated stainless steel compartment stores the ice for ready use. The new model DF-4 super flaker is similar to the DC-3 cuber in size, design and storage facilities. This unit produces up to 100 lb. of "Scotsman" crushed ice daily. There is only one moving part under refrigeration. The refrigeration system in this model is a $\frac{1}{8}$ h.p., 110-115 volt, single-phase, 60 cycle AC, hermetically sealed air-cooled compressor using "Freon-12."

Mueller Climatrol, Division of Worthington, showed heat pumps and air-conditioners. Their type 315 is an air-to-air heat pump completely factory assembled with refrigerant system hermetically sealed, pre-wired, pre-charged, and tested. It does not require the installation of refrigerant lines, valves, controls or refrigerant. By reversing the flow of refrigerant, air may be cooled in summer and heated in winter. The unit is adaptable to a variety of installations and can be economically installed in attic, basement, garage, breezeway, utility room, or commercial locations. Operation of the type 315

does not require any water. Only a provision to allow the escape of the moisture and heat filled condenser air must be made. Unit has been designed, and tested, to operate outdoors under adverse weather conditions.

The Sherer-Gillett Company, present at Atlantic City, is one of the few American corporations able to trace its beginning back more than a century. In 1852 the E. W. Gillett Company was formed and in 1905 it was merged with Sherer Brothers Company which had been organized in 1882 and at the time of the merger the name changed to Sherer-Gillett Company.

Originally a wholesaler of foods and sundry items, the company eventually gave up the wholesale business to go into the manufacturing and distribution of what was then known as a bulk food grocery counter. Since 1928 the Sherer-Gillett Company has been engaged exclusively in the manufacture of display and storage refrigerators which are distributed under the trademarked name "Sherer" on a national basis as well as in many foreign markets.

Major automobile companies displayed their air-conditioned models with experts to instruct servicemen on the installation and maintenance of automotive cooling units. The rapid growth in sales of air-conditioned cars requires an informed body of service and installation men all over the country. The companies represented included American Motors, Chrysler, Ford and General Motors.

New Two-Temperature Case



This new display case, with frozen foods in one section and dairy produce in another, is made by R. S. Macmeikan & Sons, 436, London Road, Westcliff-on-Sea, Essex.

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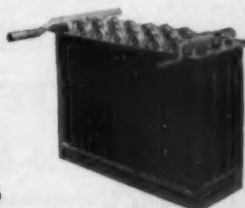
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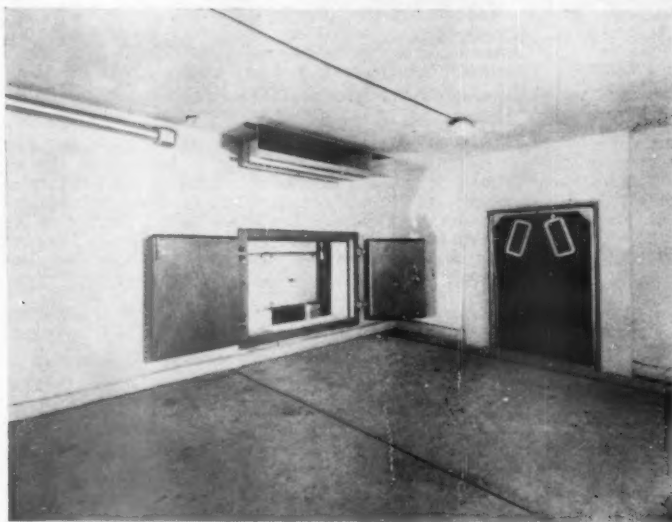
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COLD STORE *for* PET FOOD

A NEW cold store and blast freezer for Warrington Cannery Ltd. has recently been completed by Onazote Insulation Co. Ltd. The store is a single-storey building, 65 ft. by 38 ft. by 12 ft. high (external dimensions) and floor, ceiling and all external walls are insulated with 4-in. Onazote, applied in two 2-in. layers. Partition walls of 4-in. Onazote have been erected to form an airlock, and a blast-freezing chamber to precool the meat before it enters the holding room. The freezing chamber is 20 ft. by 17 ft. and the airlock 17 ft. by 11 ft. The airlock provides separate access to both the holding room and the freezing chamber and there is a further

entrance from the freezing chamber into the holding room. Heat gain through loading is thus reduced to a minimum.

All air return openings in the holding room and the blast freezer have been fitted with insulated plug doors so that the evaporator room can be defrosted without any undue rise in the store temperature, which is maintained at 0° F.

The refrigeration plant was supplied and installed by York Shipley Ltd.

The cold store is to be used for storage of cat and dog meat, prior to processing.

New Companies

The accompanying particulars of New Companies recently registered are taken from the Daily Register compiled by Messrs. Jordan and Sons Ltd.

Heatplan Ltd., 7, Great Newton Street, Liverpool. Secretary: T. Hitchen. To carry on the business of heating and air-conditioning engineers, etc. Nominal capital: £1,000. Permanent directors: John B. Tomkinson, "Eversley," Riverbank Road, Heswall, Ches.; Philip D. Tomkinson, "Lea-brook," Partridge Road, Liverpool. Solicitors: Toulmin Hodgson & Brabner, Liverpool.

E. W. Dakins Ltd., 25, London Road, Southend-on-Sea. Secretary: D. S. Fisber. To carry on the business of electrical, radio, television and refrigeration engineers, etc. Nominal capital: £100. Directors: Edwd. W. Dakins, 115, Greensward Lane, Hockley; Ann L. Dakins, 115, Greensward Lane, Hockley.

Croft (Air-Conditioning) Ltd. Nominal capital: £1,000. Directors: John R. Duigman, 32, South Way, Bognor Regis, Sussex; Walter A. Croft, 18, Church Street, Epsom, Surrey.

Mr. Whippy (Soft Freeze) Ltd., 61, Warwick Street, Leamington Spa, Warwicks. Secretary: Stella P. J. Facchino. To carry on business of manufacturers of and dealers in refrigerated vans, ice cream cabinets, etc. Nominal capital: £100. Directors: Dominic Facchino, 91, Northumberland Road, Leamington Spa; Stella P. J. Facchino, 40, Gravelly Hill North, Erdington, Birmingham.

Blue Spot Refrigeration Co. Ltd. Secretary: J. E. Wiseman. Nominal capital: £3,000. Directors: Harry Wiseman, 25, Crestway, Blackpool; John E. Wiseman, 107, Garstang Road West, Poulton-le-Fylde.

Mathewson & Rosemond Ltd., 9, Atkinson Street, Leeds. Secretary: D. U. N. Mathewson. To carry on business of plumbing and heating engineers, gas and refrigeration engineers, etc. Nominal capital: £10,000. Directors: Donald U. N. Mathewson, 7, Beckett Park Road, Leeds, 6; Robert Rosemond, 24, Wynford Avenue, Leeds, 16. Solicitor: H. E. Spencer, Leeds.

Refrigeration (P. & P. Wednesbury) Ltd., 178, Bromsgrove Street, Birmingham, 5. Secretary: R. R. Barnes. To carry on business of manufacturers of and dealers in refrigerators, refrigeration plant, etc. Nominal capital: £100. Directors: Kenneth H. Perry, 29, King's Lea Road, Solihull, Warwicks; Anthony J. Ponting, 793, Yardley Wood Road, Birmingham, 14; Reginald R. Barnes, 178, Bromsgrove Street, Birmingham, 5.

Drayton Controls (Heating) Ltd. To carry on business of manufacturers of and dealers in equipment and apparatus connected with space heating, air-conditioning, etc. Nominal capital £100. Directors: Not named. Subscribers: T. G. M. Buckley and P. D. Maloney, 18, Austin Friars, E.C.2 (solicitors). Registered by solicitors: Slaughter & May, E.C.2.

Dynamics (Bristol) Ltd., 20, Cumberland Street, Bristol, 2. Secretary: Cynthia B. Woolway. To carry on business of manufacturers of and dealers in washing machines, refrigerators, television and radio receivers and transmitters, etc. Nominal capital: £5,000. Directors: Frederick H. Woolway, 24, Falmouth Road, Bishopston, Bristol, 7; Ivan J. D. Ralls, 2, Elton Mansions, Bristol, 7; Raymond A. Earle, 154, Downend Road, Bristol, 7. Registered by H. Howes & Co. Ltd.

Harrisons Refrigeration & Electrical Rentals Ltd., 5, St. John Street, E.C.1. Nominal capital: £100. Directors: Percy D. H. Maidment, 2a, Westrow Drive, Upney, Essex; Frederick Harrison, Shaw Cottage, West Street, Seaview, I.W. Registered by Shaw & Blake Ltd.

Helimatic Ltd. To carry on business of electrical engineers, refrigerating engineers, etc. Nominal capital: £10,000. Director: to be appointed by subscribers. Subscribers: H. A. Southwell (clerk) and E. J. Libby (clerk), 7, Arundel Street, W.C.2. Registered by solicitors: Reynolds, Gorst & Porter, W.C.2.

Hetex (Southport) Ltd., 265-275, Martins Bank Building, Water Street, Liverpool. Secretary: William E. Capper. To carry on business of heating, ventilating and refrigeration engineers, etc. Nominal capital: £2,500. Directors: Richard H. Parker, 1, Delamere Road, Ainsdale, Lancs; Geo. C. Fearnley, 64, Westbourne Road, Birkdale. Solicitors: Bartley, Cooks & Bird, Liverpool. Registered by Solicitors' Law Stationery Society Ltd.

W. Norwood & Sons (Cold Storage) Ltd. To acquire the cold storage business carried on by W. Norwood & Sons Ltd., etc. Nominal capital: £14,300. Other details similar to William Norwood Ltd.

MR. F. H. HUNT RETIRES

THAT very popular and active figure in the cold-storage industry, Mr. Frederick H. Hunt, M.INST.R., M.R.S.H., has recently retired.

As vice-chairman of Bristol Industries Ltd., who have large cold store interests in the west country, Mr. Hunt has ended a business career that started in



Mr. F. H. Hunt.

1919 at The Avon Cold Storage Co. Ltd.—the largest store in the B.I.L. group, and one of the earliest to cater for the frozen food trade—where he was put to work in the engine room by his father.

Over this 40-year period Mr. Hunt has witnessed, he told "M.R.'s" representative last month, many revolutionary changes in the storage industry, chief of which perhaps has been the growth of automatic control of plants. An engine-room staff used to comprise four or five engineers to man the room

for their complete 24-hour cycle, but this is now achieved with one. An interesting point made by Mr. Hunt, which "M.R." has not heard expressed before, is that he is convinced that the incidence of illness in cold stores is less than in any other trade, probably due to the salutary effects of low temperatures.

Up to his retirement, Mr. Hunt was a council member of the National Federation for a great many years, in which he took a very active part. He was also chairman of the South of England and South Wales Cold Storage Association, and is still a member of the Institute of Refrigeration. He was also a trade director of the National Cold Stores (Management) Ltd.

Mr. Hunt has not completely severed his link with the industry, for he has set up as a consulting refrigerating engineer at his beautiful house, Bathampton House, Bathampton, Somerset.

Bristol Industries Ltd. has been acquired lately by Transport Development Group Ltd. of London, an organization headed by Mr. P. S. Henman (a portrait of Mr. Henman appeared on page 967 of our last issue when he was photographed by "M.R." at the N.F.C.S.I.T. luncheon).

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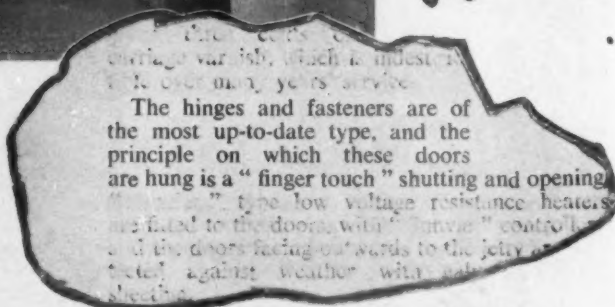
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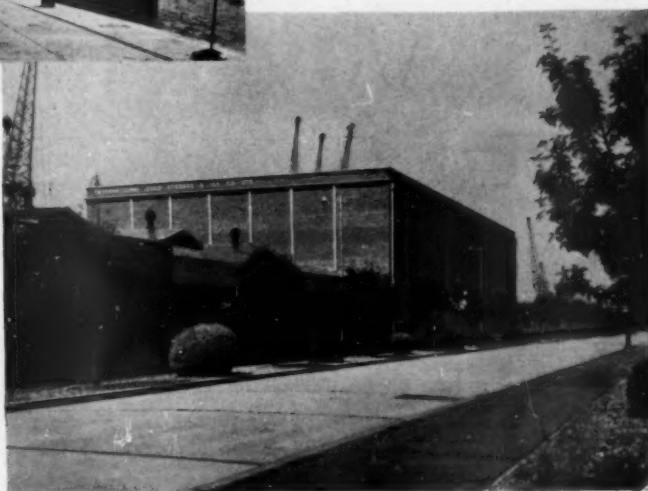
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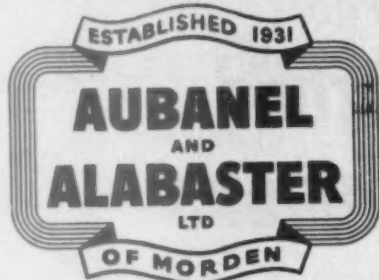
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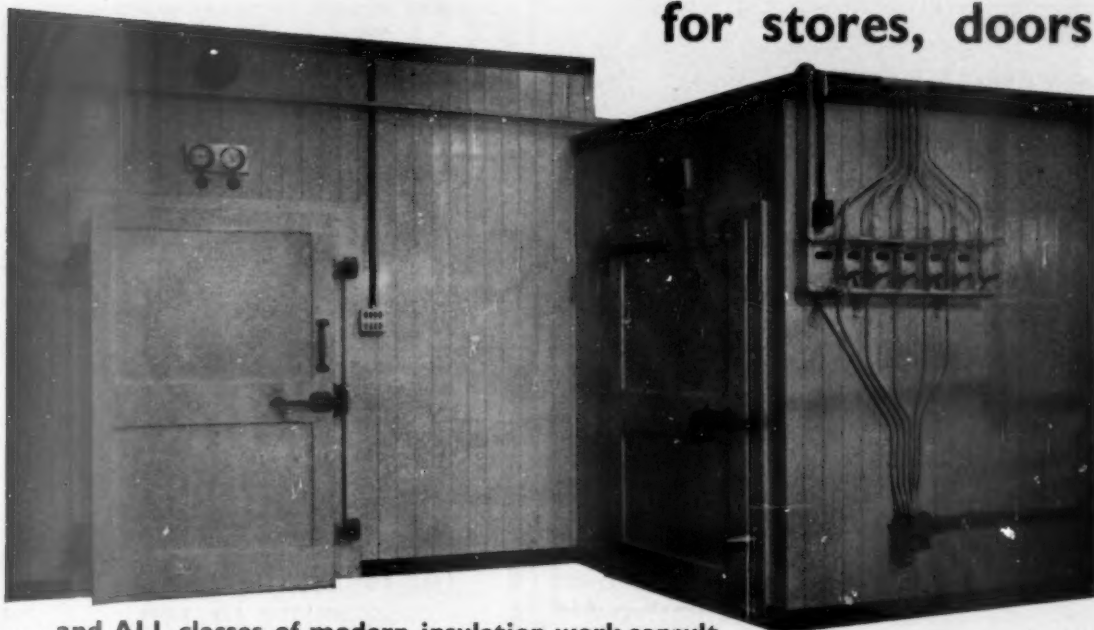
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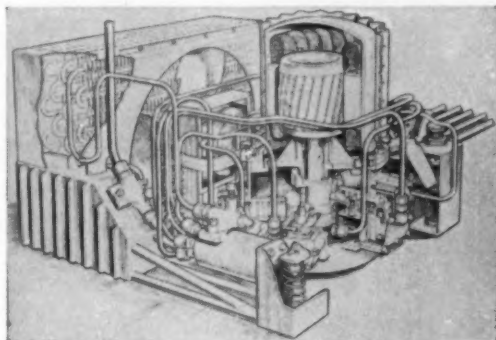
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British Patent
UK 680922

Australian Patent
154195

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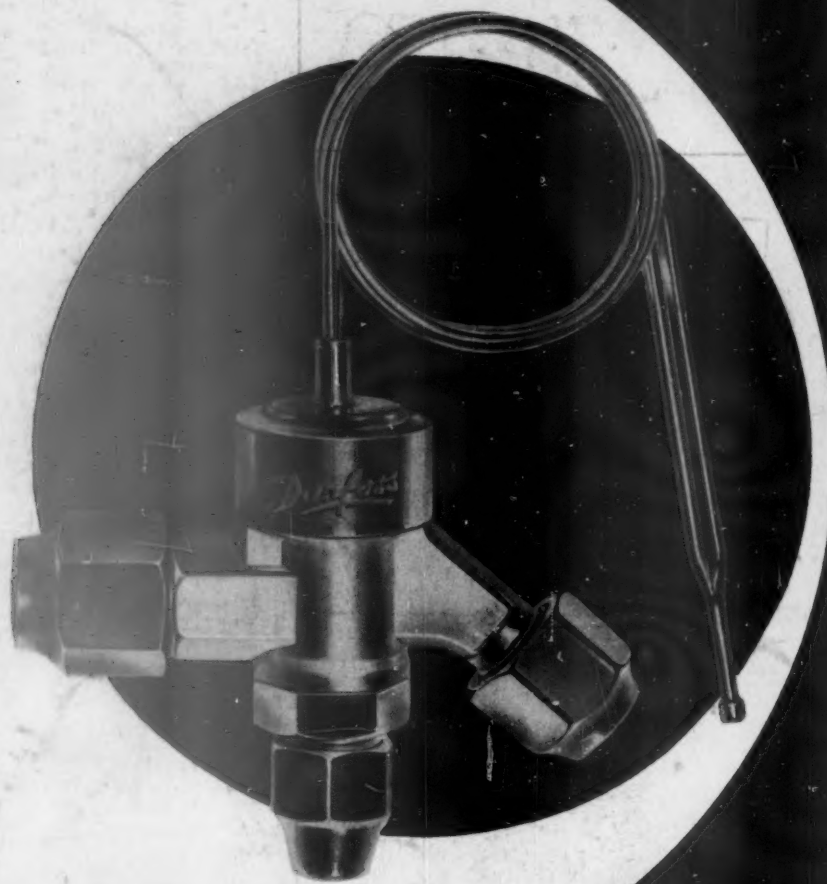
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